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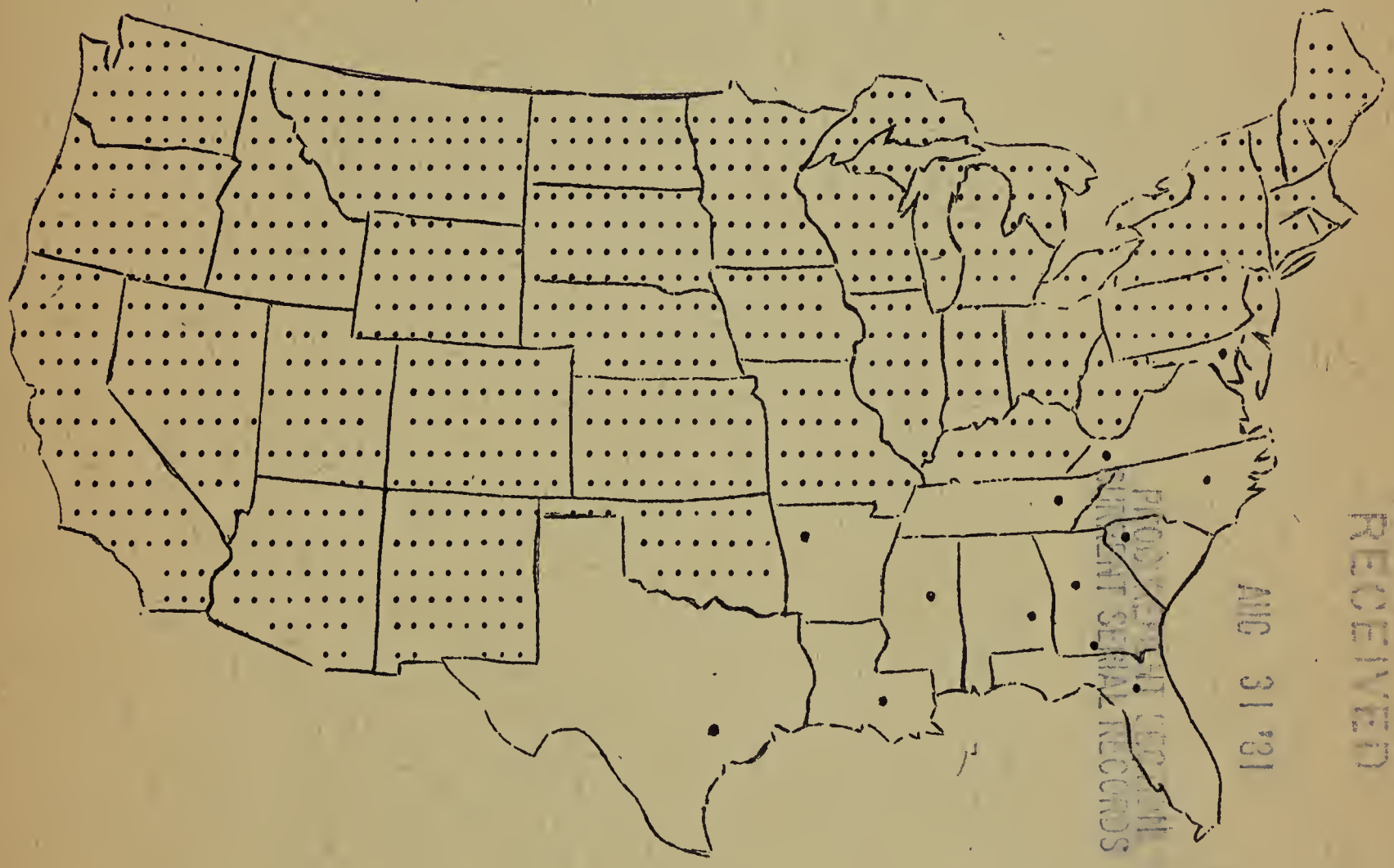
AGRICULTURAL RESEARCH ADMINISTRATION
BUREAU OF ANIMAL INDUSTRY
AND
COOPERATING SOUTHERN STATES

1952 Annual Report of S-10 IMPROVEMENT OF BEEF CATTLE FOR THE SOUTHERN REGION THROUGH BREEDING METHODS

January 1, 1953



This is a report submitted by project leaders of Project S-10 "Improvement of Beef Cattle for the Southern Region Through Breeding Methods", and compiled by the Regional Coordinator. It is intended for use of administrative leaders and workers in developing the project, and is not for general publication.

C O N T E N T S

Present Status of Beef Cattle Breeding Research in the Southern Region

by: E. J. Warwick

The Southern Regional Beef Cattle Breeding Project (S-10) was activated in 1948 under terms of the Research and Marketing Act of 1946. Detailed annual reports have been prepared by the Technical Committee annually since 1950 for the purpose of familiarizing research workers, administrators, and other interested persons with the progress of the work.

The reader is referred to the 1950 report for a history of the project and statements of the overall problems considered most important. For the most part, this discussion will be limited to things of immediate importance and interest.

Since much of the data presented is preliminary and mostly in raw form, this report is not for general publication.

Objectives

The objectives of this research are:

1. To develop breeding methods, selection criteria, and procedures which will result in beef cattle capable of higher productive efficiency and superior market qualities of product.

2. To develop beef cattle with higher reproductive efficiency, greater longevity and other aspects of lifetime productive efficiency.

3. To develop beef cattle especially adapted to conditions in various environments of the Region.

4. To explore the usefulness of systems of breeding, as:

   (a) Inbreeding
   (b) Crossbreeding
   (c) Outbreeding
   (d) Combinations of these to accomplish objectives 1, 2, and 3.

5. To study productiveness of existing or introduced stocks of beef cattle.

In pursuance of these objectives, all stations are keeping production records including birth weights, weaning weights, and type and condition scores at weaning on all calves raised. Some animals are being slaughtered at weaning, while others are performance tested in the feedlot. Growth records are kept of all replacement animals and some test animals on grass. Systematic detailed live-animal measurements at several ages are being made by a number of stations. One station is investigating the possible usefulness of certain blood constituents as indicators of potential productivity.

The carcasses of animals slaughtered are being evaluated as well as facilities permit. At some stations this is limited to securing carcass grades and weights in commercial packing plants, while at other stations more detailed analyses ranging to complete separation of carcasses into fat, lean, and bone are being made in research laboratories.

These records are building up a body of information on beef cattle production and its variability under Southern conditions which is being used and will become increasingly useful for (1) determining the records essential for selection of the most profitable beef animals, (2) determining the magnitude of the effects of many environmental factors and how to allow for them in beef cattle breeding programs, (3) evaluating lines, strains, and breeds of cattle, (4) evaluating breeding systems, and (5) analyses leading to estimates of heritability of the various characteristics of economic importance as well as of possible genetic antagonisms between them.

It is probable that many stations are now obtaining many more records than will eventually be found to be necessary.

Scope of the Work

The Bureau of Animal Industry and thirteen state experiment stations signed the original memorandum of understanding. At present projects are active at eleven state stations (Arkansas, Alabama, Florida, Georgia, Louisiana, Maryland, North Carolina, South Carolina, Tennessee, Texas, and Virginia) and at three Bureau of Animal Industry stations which are operated cooperatively with the states where located.

As of July 1, 1952, there was a total of 3,296 breeding females two years old or older being used in the project. Some of these are also used for other purposes, but all contribute information on beef cattle breeding. During the 1951-52 feeding season 526 bulls, 285 steers, and 464 heifers were performance tested under feedlot conditions. About one-fourth of these were fed individually with the remainder fed in groups.

According to a survey made July 1, 1952 expenditures of the project during the fiscal year 1951-52 totaled $29,000 9b3 money, $14,900 Bureau of Animal Industry money spent cooperatively with states, $90,163 Bureau of Animal Industry old-line funds spent principally at the three Bureau stations, and $745,865 state controlled funds. The various projects had total receipts of $309,335 leaving a net expenditure of $570,583. This is only about one cent per beef animal and less than 2.6 cents per beef cow owned by farmers in the states included in the project (calculated from numbers of "other cattle", in accompanying table).

Progress During the Year

The individual station reports which follow give details on acquisitions of cattle and facilities during the year so they will not be discussed here. Likewise, the state reports give details on technical accomplishments. Therefore, the discussion here will be limited to certain summaries prepared during the year including data from a number of stations.

Number of Cattle on Farms in Southern Region, January 1, 1953
(thousands)

State	Total- All Cattle & Calves	Cattle Other Than Kept for Milk	
		Total	Cows 2 yrs. and over
Maryland	529	142	30
Virginia	1,383	659	286
N. Carolina	892	294	102
S. Carolina	473	214	92
Georgia	1,358	741	313
Florida	1,662	1,376	731
Kentucky	1,843	914	318
Tennessee	1,774	785	280
Alabama	1,708	936	468
Mississippi	1,888	988	500
Arkansas	1,505	783	365
Louisiana	1,771	1,241	713
Texas	8,853	7,201	3,869
Totals	25,639	16,274	8,067
U.S. Totals	93,696	56,817	22,506

Analyses of data from several stations indicate that bull calves tend to be heavier than steers and steers heavier than heifers at weaning time but that the size of the differences vary from herd to herd with some evidence that breeds may differ in the degree of sexual dimorphism. Thus, it appears that if adjustments are necessary for analysis of data, records must be adjusted for sex differences on the basis of differences existing in the herd being considered rather than by using generally applicable factors.

Bulls grow considerably faster after weaning than steers and in one trial produced carcasses approximately equal in value to those of steers, although when sold on the open market the bulls sold at a large discount. This evidence, together with similar data from the North Central project, indicates that bulls can be carried to at least a year of age before final selections are made and the animals culled sold for slaughter without financial loss if they are sold on a carcass grade and yield basis.

In all data thus far studied, the weaning weights of calves increase with age of dam until maturity is reached at six to eight years. The magnitude of these changes seems to vary from herd to herd. Preliminary analysis of data indicates that repeatability of weaning weights of calves from the same cow is usually in the range of .4 to .5, thus being high enough to permit fairly early culling of cows.

Considerable study has been made of the environmental factors affecting feedlot gains of animals on test. Within the limits of the animals included in the tests (mostly calves 7 to 12 months of age), age, initial weights and type scores, and age of dam have had little influence on subsequent feedlot gains.

Information comparing breeding systems or comparing breeds and strains of beef cattle necessarily accumulates slowly because of the low reproductive rate and long generation interval. However, a large body of data on the comparative performance of Brahman crossbreds and British type cattle is now available and has been summarized during the year. Essential findings summarizing all known data both from the seven stations in this project working on these crosses and from older work are:

1. 809 Brahman crossbred calves out of British type dams averaged 28 pounds heavier at weaning than 655 calves out of similar cows by British bulls.

2. 289 calves from Brahman crossbred cows averaged 83 pounds heavier at weaning than 373 calves by the same bulls but out of British cows.

3. In the few experiments where Brahman x British crossbreds were compared with both parental breeds, the crossbreds exceeded both parental breeds by a considerable margin in weight for age up to at least two years of age indicating that the performance of the crossbreds is due in part at least to heterosis or hybrid vigor. Evidence from crossing two British breeds under the same environmental conditions is too limited for drawing conclusions, but in one experiment British crossbreds were as heavy at weaning as Brahman crossbreds.

4. In experiments since 1945, 257 Brahman crossbred steers and heifers have slightly exceeded 170 British steers and heifers, in average daily gain and efficiency in the feedlot. Older experiments were slightly in favor of Brahman crossbreds.

5. Live animal and carcass grades of both slaughter calves and fed steers have been virtually equal for the two types in experiments where Brahman crossbreds and British types have been raised together under the same environmental conditions from birth. Detailed carcass analyses have shown virtually no differences in percentages of the various wholesale cuts. Brahman crossbreds dressed an average of 2.7 per cent higher in the case of fed steers and 1.0 percent higher in the case of slaughter calves.

S-10 Problems

The personnel of the S-10 project has made remarkable progress in stocking projects, making use of existing cattle stocks already on stations, securing cattle under loan arrangements, and developing facilities for research with limited finances. This statement is particularly pertinent in view of the lack of RMA increments expected when the project was initiated. In spite of the progress made, however, much remains to be done in stocking projects to capacity and in replacing certain existing stocks with animals more suitable for the research being undertaken or contemplated.

One of the objectives of the project, which to date has received insufficient attention because of high cattle prices and insufficient funds, is that of sampling the various beef breeds to study productivity of existing stocks.

The necessity at some stations of using breeding animals jointly with nutrition and management investigations or for college teaching purposes with herds sometimes being under the immediate supervision of persons not trained in animal breeding research techniques is seriously weakening projects or parts of projects in several states.

Dwarfism has occurred in several herds and is interfering with research as originally planned. No Southern stations have as yet set up projects specifically to study this problem, but this may be necessary. In any event, the elimination of animals carrying the gene or genes for dwarfism will be a difficult task even if methods developed in California for detecting carrier mature bulls of one breed should be adapted to other ages, sexes, and breeds of animals.

PERSONNEL of the S-10 Project

STATE AGRICULTURAL EXPERIMENT STATION WORKERS
(asterisk indicates Tech. Committee Members)

Alabama	*Keith E. Gregory, W. D. Salmon	Auburn, Ala.
Arkansas	*Warren Gifford, C. J. Brown	Fayetteville, Ark.
Florida	*Marvin Koger	Gainesville, Fla.
	W. G. Kirk	Ona, Fla.
Georgia	*B. L. Southwell	Tifton, Ga.
	Walter Neville	Experiment, Ga.
Louisiana	*Richard A. Damon, Jr.	Baton Rouge, La.
Maryland	*J. E. Foster, W. W. Green	College Park, Md.
Mississippi	*T. B. Patterson, C. E. Lindley	State College, Miss.
North Carolina	*H. A. Stewart, W. C. Godley, E. U. Dillard	Raleigh, N. C.
South Carolina	*E. G. Godbey	Clemson, S. C.
Tennessee	*Charles S. Hobbs, H. J. Smith, R. P. Moorman	Knoxville, Tenn.
Texas	*Bruce L. Warwick, T. C. Cartwright	McGregor, Tex.
	R. E. Patterson, H. O. Kunkel	College Station, Tex.
	J. J. Bayles	Balmorhea, Tex.
	L. A. Maddox, Jr.	Panhandle, Tex.
Virginia	*C. M. Kincaid, R. C. Carter, J. S. Copenhaver, Frank S. McClaugherty	Blacksburg, Va.
	R. L. Arthaud, J. C. Taylor	Front Royal, Va.
	Roy Hammes	Middleburg, Va.

BUREAU OF ANIMAL INDUSTRY WORKERS

R. T. Clark, Nat'l Coordinator, Beef Cattle Research, Denver, Colo.
Everett J. Warwick, Regional Coordinator, S-10, Knoxville, Tenn.
E. H. Vernon, Supt., Iberia Livestock Experiment Farm, Jeanerette, La.
B. M. Priode, Supt., Beef Cattle Research Station, Front Royal, Va.
M. W. Hazen, Acting in Charge, Chinsegut Hill Sanctuary, Brooksville, Fla.

REGIONAL OFFICERS

R. E. Patterson, Administrative Advisor, College Station, Tex.
B. L. Southwell, Chairman, Tifton, Ga.
Charles S. Hobbs, Secretary, Knoxville, Tenn.
Marvin Koger, Executive Committee Member, Gainesville, Fla.

ALABAMA STATION

Submitted by Keith E. Gregory, December 17, 1952

1. Project Title: (Alab. 525) Improvement of Performance of Beef Cattle Through Mass Selection.

2. Objectives:

   (a) To determine the effectiveness of mass selection for total performance in beef cattle.

   (b) To develop criteria for evaluating and selecting breeding animals.

3. Accomplishments during year:

   (a) Acquisition of cattle: Seventeen Shorthorn heifer calves and one Shorthorn bull were added to the project during 1952. This completes the securing of foundation stock for the three lines.

   (b) Improvement of facilities: An additional 50 acres of land was reclaimed and seeded to hay and grazing crops during the year. This brings the total acreage, of the 975 acre unit, that has been reclaimed and seeded to approximately 300.

   A high capacity hammer mill and a mixer adapted to rations with a high roughage content were added during the year.

   (c) During the winter 1951-52, 19 bulls partly owned by the station and partly by cooperating breeders were self-fed for 154 days in dry-lot on a ground mixed ration high in roughage. Average daily gain was 1.94 pounds and 1036 pounds of feed was required per cwt. gain. 50 bulls are on test in 1952-53.

4. Future Plans:

   (a) Improvement of facilities: Reclamation of land and seeding of grazing crops will be continued as rapidly as funds permit.

   (b) Extension of project: As soon as adequate facilities are developed and an adequate number of cattle can be obtained, it is planned to determine the influence of heterosis on rate of gain, carcass quality and cow performance in beef cattle. The Angus, Hereford and Shorthorn breeds will be used in this study.

   As soon as funds and facilities can be obtained, a breeding project with laboratory animals is planned as a supplement to Regional Project S-10 to study methods of selection more extensively.

ARKANSAS STATION

Submitted by Warren Gifford and C. J. Brown, December 1, 1952

Introduction

All animals in the Arkansas project are purebred, and are managed as such. Angus, Hereford, and Shorthorn cattle at the Main Experiment Station are managed as a single herd. A herd of purebred Angus is maintained at the Livestock and Forestry Station.

Hand mating is practiced, and calves are dropped in all months of the year with only a few being dropped during the summer. All calves are weaned at eight months of age. Bull and steer calves not used in progeny feeding trials are sold at weaning or shortly thereafter. All females are kept for replacements and after weaning are pastured or group fed to make acceptable growth. These heifer groups are made up according to age without regard to sire or breed.

1. Project Title: The Determination of Adequate Records of Performance Tests for Beef Cattle.

2. Objectives:

To develop practical but adequate methods for evaluating the breeding worth of beef sires and dams which would include the following:

(a) A system of measuring variations in young animals and the values of such measures in predicting variations in the same animals at more mature ages.

(b) Methods for measuring and evaluating the records of performance of brood cows.

(c) The determination of the kind of records and number of progeny necessary to prove beef sires.

3. Accomplishments during year:

(a) During the year December 1, 1951 to December 1, 1952 the following cattle and facilities have been acquired for use in the Arkansas beef cattle breeding project:

One Angus bull, Eileenmere F 80", was obtained for use as a herd sire on Angus cows at the Livestock and Forestry Station. One Angus bull, one Hereford bull, 25 Angus heifers, ten Hereford heifers, and three Shorthorn heifers were added to the herd as replacements.

Approximately 3,100 acres of land to be operated as a part of the Main Experiment Station were purchased at a cost of $62,000 for use as a pasture area by this project. A total of $71,000 has been spent for the construction of buildings and equipment

for operation of this new beef cattle area. The following buildings have been completed:

Three cottages for herdsman and two feeders
One office and laboratory building
One machine shed
One general purpose barn
One hay storage barn and cattle shed
One experimental feeding barn with facilities for the individual feeding of 50 animals
One work shed with corrals and working pens
Four double herd bull shelters
Two wells with pump houses and water system installed
One barn for horses
One hay shed
Miscellaneous equipment such as feed bunks, calf creeps, grain and mineral troughs

Machinery and equipment acquired during the year by either purchase or lease arrangements include two John Deere Model M tractors, one hay baler, one side delivery hay rake, one 1½-ton Dodge truck, one 3/4-ton Jeep pick-up, one Letz mill, one wagon, one horse trailer, one brush saw, and miscellaneous hand tools.

At the Livestock and Forestry Station further development of pastures on the new beef cattle area have been in progress.

(b) The following research has been completed or is in progress: Individual feeding of bull progeny from one Hereford and two Angus sires has been completed. At present, progeny of a tested bull sold to a cooperating farmer are being tested along with progeny of the Experiment Station herd sires.

Subjective evaluation studies of all animals in herds were continued. Growth and development changes in both young and mature animals, as indicated in weights and measurements, were recorded.

Repeatabilities of cow performance factors have been calculated. Relationships between climatic factors and performance of bulls on feedlot test have been studied.

4. Future Plans:

Continuation of studies of milk production in beef cattle.

Continuation of growth and development studies on both young and mature cattle.

Continuation of subjective evaluation studies.

Continuation of individual feeding of bull progeny of sires with the feeding of steer and heifer groups when possible.

Continuation of the long-time program of developing lines within the herds.

5. Publications:

Going Ahead at University of Arkansas. Hereford Journal, July 1952, p. 272.

Record of Performance Tests for Beef Cattle in Breeding Herds, (I) Milk Production, (II) Milk Production and Subsequent Growth in Calves. Arkansas Station Bulletin 531.

6. Publications Planned:

Station bulletin on subjective evaluation.

Summary of progeny feeding trials.

Masters thesis on climatic factors affecting the feedlot performance of test bulls.

Masters thesis on repeatability of factors affecting cow performance.

POSTWEANING PERFORMANCE OF 1951 CALVES FULL FED AFTER WEANING
(or pastured for high gains)

Arkansas Station

Line or group designation Location	Flying L. Anxiety 1st Main Sta.	Bar Prince Main Sta.	Alford's Prince Eric Main Sta.	Bl. Prince B. of UArk 11 Main Sta.	Greenhill Duke Main Sta.
Breeding of calves	Heref.	Angus	Angus	Angus	Heref.
Av. inbreeding (%)	0	0	0	0	0
Bulls					
No.	9	8	8	1	1
Av. weaning wt.	552	601	541	502	484
Av. 12 month wt.	700	795	753	670	670
Length of feeding period	154	154	154	154	154
Feed per cwt. gain (lbs.)					
Concentrates	641	678	657	558	596
Roughage	333	339	328	279	296
Av. daily gain on test	1.88	1.66	1.74	1.75	
Av. type score (12 mo.)*	72	74	73	66	64
Steers					
No.		1			
Av. weaning wt.		480			
Av. 12 month wt.		659			
Length of feeding period		154			
Feed per cwt. gain (lbs.)					
Concentrates		579			
Roughage		289			
Av. daily gain on test		1.66			
Av. type score (12 mo.)*		70			

* All Arkansas scores according to a scale with top possible score 100.

PERFORMANCE OF COW HERDS. 1952 CALVES

Arkansas Station

Line or group designation	Blackcap Eileenmere 299	K. Eileen-mere 2	Eileenmore F 80	Alford's Pr. Eric	Bar Pr. 2 of Sunray	Black Pr. B of UArk 11
Location	Livestock & Forestry Sta.	Livestock & Forestry Sta.	Livestock & Forestry Sta.	Main Station	Main Station	Main Station
Breed of sire	Angus	Angus	Angus	Angus	Angus	Angus
Breed of dam	Angus	Angus	Angus	Angus	Angus	Angus
No. cows bred	11	21	15	44	13	15
*No. cows calving	14	23	0	30	12	15
No. calves raised	12	18		28	11	13
Av. birth wt.	58	52				
Av. birth date				7-4 -52	4-23-52	4-11-52
Were calves creep fed?	Only fall calves creep fed			No	No	No
**Av. wt. 6 mo. (lbs.)	382	325		(15) 349	(9) 311	(11) 313
**Av. weaning wt.	424	420		(18) 433	(14)426	(11) 389
**Av. wean. type score				(15) 71.3	(12) 68.8	(15) 64.7

* During period Dec. 1, 1951 to Nov. 30, 1952.

** Numbers in parenthesis refer to numbers of calves weighed or scored and in some cases include 1951 fall calves reaching the specified ages during the period Dec. 1, 1951 to Nov. 30, 1952.

PERFORMANCE OF COW HERDS. 1952 CALVES

Arkansas Station

Line or group designation	Flying L. Anxiety 1st	Greenhill Duke	WHR Helmsman 8	WHR Helmsman 20	Nobleman 5th
Location	Main Sta.	Main Sta.	Main Sta.	Main Sta.	Main Sta.
Breed of sire	Hereford	Hereford	Hereford	Hereford	Shorthorn
Breed of dam	Hereford	Hereford	Hereford	Hereford	Shorthorn
No. cows bred	19	11	5	1	8
* No. cows calving	18	10	4	1	5
No. calves raised	18	10	4	1	5
Av. birth date	9-11-52	9-14-52	7-16-52	12-11-51	5-9-52
Were calves creep fed?	No	No	No	No	No
** Av. wt. 6 mo. (lbs.)	(18) 312	(7) 319		(2) 228	(7) 331
** Av. weaning wt.	(23) 444	(7) 381		(2) 318	(5) 429
** Av. wean. type score	(32) 70.8	(10) 70.4	(3) 66.3	(1) 70.0	(7) 69.1

* During period Dec. 1, 1951 to Nov. 30, 1952.

** Numbers in parenthesis refer to numbers of calves weighed or scored and in some cases include 1951 fall calves reaching the specified ages during the period Dec. 1, 1951 to Nov. 30, 1952.

FLORIDA STATION

Submitted by W. G. Kirk and Marvin Koger, December 31, 1952

There are four Florida projects in operation which are contributing to the S-10 regional project. The project at Belle Glade, "Breeding Beef Cattle for Adaptability to South Florida Conditions", has been under way for several years but has not been included. It is being revised and will be submitted for approval as a contributing project. A project involving the purebred cattle at the Main Station is also being planned and will be submitted.

1. Project Title: (Project No. 390) Breeding Beef Cattle for Adaptation to Florida. Location: Range Cattle Station.

2. Objective:

To determine the value of different crosses and strains for foundation animals and commercial beef production.

3. Accomplishments during year:

Another year's data was collected, and more females of known breed composition were added to herd. Representative steers of different breeding were fed out. Feedlot performance and carcass data were obtained. Weaning data on 1952 calf crop is shown in accompanying table.

4. Future Plans:

Further data on weaning performance, growth on pasture, and feedlot performance of various crosses will be obtained.

5. Publications:

None.

6. Publications Planned:

A scientific paper or bulletin will be published on factors affecting weaning weight of calves at the Range Cattle Station. This material has been summarized and presented in a Master's thesis by F.M. Peacock.

1. Project Title: (Project No. 615.) Influence of Breed Composition and Level of Nutrition on Adaptability of Cattle to Central Florida Conditions. Location: Range Cattle Station.

2. Objective:

To determine the relative productivity of cows with different proportions of Shorthorn and Brahman blood when run under pasture programs designed to supply low, medium and good nutrition levels.

3. Accomplishments during year:

Preparation of pastures was started, an irrigation system installed, and a part of the cattle not available on the station was acquired.

4. Future Plans:

The remainder of cattle will be acquired and pastures arranged for the trial. A part of the cattle will be started on trial in 1953.

5. Publications:

None.

6. Publications Planned:

None, for coming year.

1. Project Title: (Project No. 627) Pasture Programs and Breeding Systems for Beef Production on Flatwoods Soils of Central and North Central Florida. Location: Gainesville.

2. Objectives:

To evaluate the influence of pasture programs and breeding plans on beef production with a cow-calf operation.

Starting with a cow herd typical of most cattle in Florida (containing one-half or more Brahman blood with the remainder being mixed breeding) and bulls of different breeds, the most effective combinations will be determined.

3. Accomplishments during year:

300 acres of pasture were seeded and established for grazing beginning in September. One hundred two-year-old heifers were purchased and bred to bulls of four breeds; namely, Angus, Brahman, Hereford and Shorthorn.

4. Future Plans:

More area will be developed to carry the increase from the herd. The present program of breeding the foundation cows to bulls of different breeding will be continued until enough female offspring are produced for subsequent breeding operations. Data will be obtained on growth, quality scores, feedlot performance and carcass data in the case of steers.

5. Publications:

None.

6. Publications Planned:

None planned for this year since the first calf crop will not be weaned until this fall.

1. Project Title: (Project No. 629) Selection of Cattle for Beef Production in Southeastern United States. Location: Brooksville. (Cooperative with BAI)

2. Objectives:

To test the performance of different breeds and crosses in different breeding systems and to determine if the combining ability of breeds used for crossbreeding can be improved by cross-progeny testing.

3. Accomplishments during year:

The project was revised and a cooperative effort between the Bureau of Animal Industry and Florida Station was achieved.

A herd of 30 young Santa Gertrudis females was acquired on loan for the station. A herd of 27 Hereford females and 2 bulls was purchased. A year's data was obtained from cattle already on station, and is summarized in accompanying table.

4. Future Plans:

An Angus herd will be acquired to complete the foundation herds called for. Young bulls to be used in the cooperative commercial testing programs will be grown out. More complete growth data will be kept and cattle managed in such a manner that an unbiased evaluation of the performance of the various breeding groups can be obtained.

PERFORMANCE OF COW HERDS. 1952 CALVES

Florida Station

Line or group designation	Hereford	Angus	Red Poll	Brahman		Br.x Ang.	
Location	Gainesville	Gainesville	Brooksville	Brooksville	Brooksville	Brooksville	Brooksville
Breed of sire	Hereford	Angus	Red Poll	Brahman	Brahman	Br.x Ang.	Br.x Ang.
Breed of dam	Hereford	Angus	Red Poll	Brahman	Mixed Crosses	Br.x Ang.	Mixed Crosses
No. cows bred	15	14	19	16	30	27	29
No. cows calving	14	14	17	8	21	20	18
No. calves raised	14	14	17	8	19	19	17
Av. birth wt. (lbs.)			74	54	70	54	62
Av. birth date	2-15-52	2-8-52	2-20-52	3-13-52	2-20-52	2-18-52	2-15-52
Were calves creep fed?	No	No	No	No	No	No	No
Av. wt. six mo. (lbs.)	390	377	387	326	392	352	384
Av. weaning date	10-2-52	10-2-52	10 on 9-5 7 on 10-30	3 on 9-5 5 on 10-30	12 on 9-5 7 on 10-30	15 on 9-5 4 on 10-30	12 on 9-5 5 on 10-30
Av. weaning weight	453	445	384	331	422	378	419
Av. wean. type score *	11	12	8	11	8	9	9
Av. wean. cond. score *	12	11	9	9	10	10	10

* 6-8 = Medium; 9-11 = Good; 12-14 = Choice.

PERFORMANCE OF COW HERDS

Florida Station
Range Cattle Station

Name of sires	Smoky	David	Emperor	Crossbred bulls ****	Smoky and Emperor	Purebred Shorthorn	Purebred Hereford	Purebred Shorthorn
Breed of sire	Brahman	Brahman	Brahman	Sh. x Br.	Brahman	Shorthorn	Hereford	Shorthorn
Breed of dam	*	*	*	Gr. Brah.	½Sh.x ½Br.	½Sh.x ½Br.	Gr. Brah.	P'bred Br.
No. cows bred	49	58	46	53	17	7	23	18
No. cows calving	38	27	32	33	17	7	20	16
No. calves weaned	38	27	31	32	17	7	20	16
Av. birth wt.	67	68	70	71	61	65	71	63
Av. birth date	3-15-52	4-7-52	3-5-52	2-24-52	3-1-52	2-24-52	3-12-52	2-17-52
Were calves creep fed?	No	No	No**	No	No	No	No***	No
Av. wt. 6 mo. (lbs.)	400	352	414	417	438	411	414	450
Av. wean. date	10-12-52	10-21-52	9-28-52	10-1-52	10-2-52	7-16-52	9-17-52	9-10-52
Av. weaning wt.	441	377	452	477	467	461	447	509
Av. wean. type score	9	8	9	10	9	10	10	9
Av. wean. cond. score	10	8	10	11	10	10	11	10
Quality of pasture	Fair to Good	Fair (all Native)	Good	Good	Good	Good	Fair (all Native)	Good

* Mostly grade Brahman with some grade Shorthorn, Devon, and Hereford cows.
** 4 calves creep fed.
*** 1 calf creep fed.
**** These cattle on phosphorus source test.

1951 CALVES FULL FED AFTER WEANING

Florida Station
Range Cattle Station

Breeding of cattle	3/4 Br. 1/4 Sh.	1/2 Sh. 1/2 Br.	Grade Angus	Grade Brah.	Grade Brah.	Grade Brah.	Grade Brah.	Grade Brah.*	Grade Brah.*
No. of animals	2	2	2	3	3	4	4	3	3
Av. 6 mo. wt.	414	433	410	445	472	381	374	395	425
Av. weaning wt.	465	483	483	527	505	391	378	433	477
Av. wean. type score	9	8	10	8	10	8	8	8	9
Av. wean. cond. score	10	9	10	9	10	9	8	8	9
Av. wt. put on feed	428	498	438	552	553	446	449	558	567
Av. age put on feed	237	235	253	310	275	353	332	385	387
Length of feeding period	120	120	120	120	120	120	120	120	120
Av. wt. at 12 mo.	-	-	-	672	-	475	514	525	557
Av. gain on feed	225	223	180	217	242	289	285	283	302
Av. slaughter wt.	653	721	618	669	795	735	734	841	869
Feed per cwt. of gain									
Roughage	230	233	272	257	225	199	200	168	147
Concentrates	498	548	520	630	545	484	494	581	551
Av. age at slaughter	357	375	373	419	364	473	452	514	506
Slaughter grade	10	10	10	9	11	9	9	9	9
Av. dressing percent	59.3	60.3	59.8	59.7	60.7	58.7	57.9	59.1	61.1
Av. carcass grade	10	11	10	10	11	9	9	9	10

* Short yearlings.

GEORGIA STATION

Submitted by B. L. Southwell, December 23, 1952

1. Project Title: The Improvement of Beef Cattle in Georgia Through the Use of Selection for Economic Factors Brought Out in the Process of Inbreeding, Crossbreeding, and Outbreeding.

2. Objectives:

(a) Sire testing studies with Polled Hereford and Angus cattle.

(b) The value of the Brahman breed in developing cattle that are better adapted to the climatic and feed conditions of the Coastal Plain area of the Southeast.

3. Accomplishments during year:

(a) Ten purebred Polled Hereford heifers were purchased in the fall of 1952 to be used in the future breeding studies. Five Polled Hereford bull calves were purchased in the fall of 1952. These were from two herds. They are being full-fed in dry lot during the winter in the same manner as the calves produced on the station. If performance during the feeding period together with type score justify it, one or more of these bulls will be progeny tested. An Angus bull was purchased in early 1952 and was bred to the Angus cows during the 1952 breeding period.

The grade Hereford herd was removed from crossbreeding studies when the calves were weaned in September 1952. All the crossbred females from this herd (Brahman x Hereford and Angus x Hereford) are being retained to determine the value of the two crosses in future breeding studies. The six first-cross Brahman and six first-cross Angus heifers were bred in 1951 to calve in February and March 1952. Five each of these two crosses calved. All calves from these crossbred heifers were slaughtered at weaning.

No new equipment was added during the year other than items needed for immediate use.

(b) 1. Polled Hereford Sire Testing Studies: Three bulls were proved during the fall and winter 1951-52. All of the off-spring were placed in dry lot approximately two weeks after weaning and full-fed for 140 days. At the end of the feeding test each offspring received a rating based on the following formula:

$$\text{Rating} = \text{Type Score} + \frac{\text{Av. Daily Gain}}{.05}$$

Each sire received a rating equal to the average of all his off-spring. Type score in the above formula accounts for 50 per cent of the rating and rate of gain accounts for 50 per cent.

The three Polled Hereford bulls rated as follows:

Sire No. 497 = 80.83
Sire No. 297 = 80.09
Sire No. 294 = 77.45

Sire No. 297 is a son of 497. A son of 497 fed during the fall and winter 1951-52 made an individual rating of 99.85 which was the highest rating made by any calf fed. He was bred to a group of females during 1952 which will enable him to be proved during the fall and winter 1953-54.

2. Angus: Two Angus sire groups were represented in the 1951-52 studies. Sire No. 500 made a rating of 71.05, while Sire No. 27 had a rating of 70.65. As in past years the Angus calves were better in type score than the Polled Herefords, but did not make as good rate of gain.

All calves raised were fed in the sire testing studies. They were full-fed Coastal Bermuda hay and also full-fed a grain mixture composed of:

6 parts cracked shelled corn
1 part cottonseed meal (36 per cent protein)

Several of the calves were treated for pneumonia during the dry lot feeding period which affected somewhat the rate of gain. The calves were creep-fed a grain mixture (the same formula as above) during the suckling period.

3. Crossbreeding Studies - First-cross Brahman Versus First-cross Angus Calves: The first-cross Brahman and first-cross Angus calves were out of comparable Grade Hereford dams. They were creepfed the same grain mixture as were the Polled Hereford and Angus calves. All the steer calves were slaughtered at weaning. Birth weight, slaughter data, etc., are included in attached tables.

The results of postweaning dry lot performance of the first-cross heifers are shown in attached tables. They were fed under comparable conditions to the Polled Hereford and Angus heifer calves. The first-cross Angus performed slightly better in the feedlot than did the first-cross Brahman. Neither group performed as well as the purebred Herefords.

Five, $\frac{1}{2}$ Brahman x $\frac{1}{4}$ Hereford x $\frac{1}{4}$ Native and five, $\frac{1}{2}$ Angus x $\frac{1}{4}$ Hereford x $\frac{1}{4}$ Native, two-year-old heifers calved in the spring of 1952. Data on these calves which were sired by a Hereford bull are included in attached forms. The $\frac{1}{2}$ Brahman x $\frac{1}{4}$ Hereford x $\frac{1}{4}$ Native heifers dropped calves weighing slightly more than the calves out of $\frac{1}{2}$ Angus x $\frac{1}{4}$ Hereford x $\frac{1}{4}$ Native heifers. The calves out of the Brahman heifers were approximately 90 pounds heavier at weaning. They graded higher as slaughter calves in the carcass.

4. Future Plans:

Sire testing studies with Polled Herefords will be continued. Sufficient numbers of cattle will be maintained to prove three bulls each year. A new project is planned using Polled Herefords. In addition to the sire testing group, it is anticipated that a second herd of approximately 20 females will be maintained and selected principally for weight of calves at weaning. Another herd of approximately 20 females will be selected primarily for rate of gain in the feedlot during a 140-day feed in dry lot starting soon after weaning.

The Angus herd will be maintained at from 20 to 30 brood cows.

The study involving first-cross Brahman and first-cross Angus calves will be discontinued in 1953. The first-cross heifers from this study will be maintained in an effort to determine the comparative value of two crosses in reproductive performance.

5. Publications:

Southwell, B. L. and E. J. Warwick. Factors Influencing Weaning Weights and Subsequent Feed Lot Gains of Polled Hereford Calves. Proc. Assn. South. Agr. Workers, 1952, pp. 56.

POSTWEANING PERFORMANCE OF 1951 CALVES FULL FED AFTER WEANING

Georgia Station
Coastal Plain Station, Tifton

Line or group designation	Sire Testing					Crossbreeding	
	Sire 497	Sire 294	Sire 297	Sire 500	Sire 27		
Breeding of calves	P.H.	P.H.	P.H.	Ang.	Ang.	Br. x Gr.Her.	Ang.x Gr.Her.
Bulls, No.	3	6	8	4	0		
Av. weaning wt.	535	465	456	554			
Av. 12 mo. wt.	853	817	820	784			
Length of feeding period	140	140	140	140			
Feed per cwt. gain (lbs.) Concentrates Roughage	*	*	*	*			
Av. daily gain on test	2.42	2.27	2.34	1.73			
Av. type score (12 mo.)***	83	79	77	78			
Heifers, No.	8	5	9	8	4	6	9
Av. weaning wt.	479	385	412	448	463	509	477
Av. 12 mo. wt.	752	633	730	639	675	724	700
Length of feeding period	140	140	140	140	140	140	140
Feed per cwt. gain (lbs.) Concentrates Roughage	**	**	**	**	**	659 193	726 166
Av. daily gain on test	1.83	1.57	1.82	1.40	1.47	1.59	1.71
Av. type score (12 mo.)***	82	77	78	83	82	-	-

* Fed in groups by weight. Av. feed consumption per cwt. gain for all bulls was 572 lbs. concentrates and 132 lbs. hay.

** Fed in groups by weight. Av. feed consumption per cwt. gain for all Angus and Polled Hereford heifers was 667 lbs. concentrates and 176 lbs. hay.

*** On scale with 100 as top possible score.

PERFORMANCE OF COW HERDS. 1952 CALVES

Georgia Station
Coastal Plain Station, Tifton

Line or group designation	Sire Testing		Crossbreeding			
Breed of sire	P. Here.	Angus	Brah.	Angus	Here.	Here.
Breed of dam	P. Here.	Angus	Gr. Her.	Gr. Her.	½B,¼H ¼ Native	½A,¼H ¼ Native
No. cows bred	55	32	18	19	6	6
No. cows calving	50	28	16	17	5	5
No. calves raised	47	27	14	15	5	5
Av. birth wt. (lbs.)	70	55	68	80	64	60
Av. birth date	2-11-52	2-14-52	2-23-52	2-12-52	2-17-52	3-3-52
Were calves creep fed?	Yes	Yes	Yes	Yes	Yes	Yes
Av. wt. 6 mo. (lbs.)	353	361	459	419	403	323
Weaning date	9-17-52	9-17-52	9-18-52	9-18-52	9-18-52	9-18-52
Av. weaning wt.	432	416	503	485	461	350
Av. wean. type score	3+(G+)	2-(Ch-)				
Live slaughter grades			Ch-	Ch	G+	G
Calves slaughtered at weaning:						
1. Steer or bull calves						
No.			7	6	1	3
Av. age			205	223	180	186
Av. wt.			524	489	400	320
Av. slaughter grade			G-	Ch-	G	G-
Av. dressing percent			58	57	54	54
Av. carcass grade			G-	Ch-	Ch	G
2. Heifer calves						
No.					4	2
Av. age					222	219
Av. wt.					476	395
Av. slaughter grade					Ch-	G
Av. dressing percent					56	53
Av. carcass grade					Ch-	G

LOUISIANA STATION

Submitted by R. A. Damon, Jr., December 30, 1952

1. Project Title: The Improvement of Beef Cattle for the Southern Region Through Breeding Methods.

2. Objectives:

   (a) To develop types of beef cattle best suited to conditions along the Gulf Coast.

   (b) To compare the performance of several breeds of beef cattle and crosses between these breeds with respect to rate of growth on pasture, fattening ability, and meat quality of steers.

   (c) To estimate the amount of hybrid vigor that can be expected to result from crossing beef breeds and to ascertain the methods best suited for its utilization and maintenance.

3. Accomplishments during year:

   (a) Thirty-six steers resulting from breeding work conducted before revision of this project were fed for 140 days in dry lot. The results of these feeding trials are reported in the accompanying tables.

   (b) One hundred and sixty-two head of cattle of advanced age or of unknown breeding were sold at auction. Forty head of purebred Brahman cattle, thirty-two head of purebred Angus, and eight head of Hereford cattle were purchased to replace these cows in the breeding project. Forty-eight head of Brahman-Angus cattle were transferred from the Iberia Livestock Experiment Farm at Jeanerette, Louisiana to the University at Baton Rouge for inclusion in the project. A registered bull of Charolaise breeding was purchased.

   (c) Six herds of thirty-two cows each were formed, and each of these herds was bred to a bull of a different breed. Breeding herds consisted of eight Hereford, eight Angus, eight Brahman, and eight Brahman-Angus cows. These herds were made up as similar to one another as possible, cows being allotted on the basis of age, breeding, weight, and quality. The bulls used were of Hereford, Angus, Brahman, Brahman-Angus, Shorthorn, and Charolaise breeding. The breeding season extended from April 15, 1952 to July 31, 1952.

   (d) The University now has approximately four hundred acres of pasture land available for this experimental breeding work. In order to conduct the project as outlined, it will be necessary to double this acreage. Accordingly, land is being cleared as rapidly as possible. At the present time, approximately fifty acres have been cleared, and it is intended to clear another three hundred and fifty acres.

4. Future Plans:

The breeding scheme outlined above (3c) will be continued for another two or three years, depending on the number of progeny ensuing. The heifers resulting from this breeding will be retained and records kept of their development and performance. It is planned to build a feeding shed in order that the steer calves resulting from the project can be fed in dry-lot where records of their performance will be obtained. After the dry-lot feeding the steers will be slaughtered in the University meats laboratory and carcass information will be gathered.

After three or four crops of crossbred and purebred calves have been produced as described above, a second phase of the project will be initiated. In this phase, the crossbred females produced by breed crossing will be bred back to bulls of each of the parental breeds. Purebred animals will be bred at the same time in order to have within year comparisons between backcross and purebred animals. Two or three years will be devoted to this work.

A third phase will then be conducted in which the crossbred females will be bred to bulls of a third breed. Again, purebred females will be included in the breeding herds.

5. Publications:

Andrews, N. T. Feed-lot Performance of Various Beef Grades and Crosses - A Master's thesis.

6. Publications Planned:

As soon as sufficient data become available, publications will be prepared.

Louisiana Station (continued)
Jeanerette

1. Project Title: The Improvement of Beef Cattle for the Southern Region Through Breeding Methods.

2. Previous Work:

Breeding investigations have been conducted for more than twenty years, at the Jeanerette Station, in an effort to develop strains of beef cattle particularly adapted to the Gulf Coast Region. It is necessary at this time to develop a plan whereby the progress of this work can be evaluated. One part of the evaluation of these lines of cattle has been instituted by the transfer of 48 head of Brahman-Angus cattle to Baton Rouge for inclusion in the cross-breeding project at that station. As a further step in the examination of the accomplishments of the research work, a tentative research plan for the Jeanerette Station has been drawn up. The tentative plan is summarized below.

3. Purpose of Investigation:

(a) To gather data designed primarily to yield a partial evaluation of the strains of Brahman-Angus and Africander-Angus cattle which have been developed at the Jeanerette Station.

(b) To provide for the propagation and development of these strains of cattle.

4. Method of Procedure:

(a) Brahman-Angus herd: It is proposed that the presently available approximately 80 cows be divided into four lines of approximately 20 cows each which will hereafter be maintained as closed lines. The original division will be at random within sire progeny and age groups so that the four lines should be comparable initially. It is thought desirable to set up these closed herds in order that if animals of this breeding prove useful in the tests now underway and planned, crosses can be made between the lines with the line cross animals having a lower coefficient of inbreeding than would be attainable if the herd were operated as a single breeding unit.

(b) Africander-Angus herd: The approximately 40 cows of this line now available will be bred in two closed lines, according to the same procedures as outlined for the Brahman-Angus, except that emphasis will be put on the elimination of the gene for "double muscling", now present in high frequency in the line. It is planned to increase the number of cows in this line to at least 60 in the near future.

(c) Brahman herd: Enough additional Brahman cows will be assembled from diverse sources to make a herd of at least 24 breeding females, increasing to 40 head or more as feed supplies permit. The first year after the initiation of this program, half of these should

Louisiana Station (continued)
Jeanerette

be bred to a Brahman bull and half to an Angus, with the division of cows going to each bull being at random within sire and age groups. In the second and later years, two-thirds of the cows should be bred to a Brahman bull and one-third to an Angus.

(d) Aberdeen-Angus herd: A herd of 24 or more Angus cows should be purchased giving attention to acquiring animals of several different blood lines. They should be carried on in exactly the same manner as the Brahman herd discussed above.

(e) First Cross Females: All the sound Brahman x Angus and Angus x Brahman crossbred heifers should be saved until this group is built up to 24 cows. Subsequently, they should be selected and culled on the same basis as the other herds. They should all be bred to representative bulls selected from the Brahman-Angus lines.

(f) Steer Feeding Procedures: Each year there will be groups of steers available for feeding, representing the several types of breeding involved. These should be put in dry lot at weaning and full fed for approximately 150 to 180 days aiming at a High Good to Low Choice finish. Initially they will be fed ground mixed rations starting with a 1:1 concentrate-roughage ratio and shifting to a 2:1 ratio at the end of the first month on feed.

POSTWEANING PERFORMANCE OF 1951 CALVES FULL FED AFTER WEANING

Louisiana Station
Baton Rouge

Breeding of calves	7/8 Here. 1/8 Brah.	Angus	Angus-Here.	4/8 Angus 1/8 Brah. 3/8 Here.	4/8 Char. 1/8 Brah. 3/8 Here.	3/4 Brah. 1/4 Here.	3/4 Brah. 1/4 Ang.	5/8 Brah. 3/8 Here.
Steers, No.	2	1	1	1	3	2	1	2
Av. weaning wt.	438	450	380	485	505	470	510	495
Length of feeding period	140	140	140	140	140	140	140	140
Av. da. gain on test	1.93	1.71	1.75	1.96	1.86	1.56	1.86	1.89

Table continued

Breeding of calves	Here.	Here. Angus	Afric. Angus	Char. Angus	Char. Here.	S'horn Here.	4/8 S'horn 1/8 Brah. 3/8 Here.	
Steers, No.	3	3	6	3	2	4	2	
Av. weaning wt.	380	443	434	447	463	411	455	
Length of feeding period	140	140	140	140	140	140	140	
Av. da. gain on test	1.87	2.21	1.78	2.21	2.38	1.95	1.92	

PERFORMANCE OF COW HERDS. 1952 CALVES

Louisiana Station
Baton Rouge

Location	Baton Rouge	Baton Rouge	Baton Rouge	Baton Rouge	Baton Rouge	Baton Rouge	Baton Rouge	Baton Rouge	Baton Rouge	Baton Rouge	Baton Rouge	Baton Rouge
Breed of sire	Brah.	Brah.	Heref.	Angus	Heref.	Angus	S'horn	Char.	S'horn	Char.	Brah.	Afric.-Angus
Breed of dam	Brah.	Heref.	Heref.	Angus	Angus	Heref.	Heref.	Angus	Angus	Heref.	Angus	Heref.
No. calves raised	6	7	4	5	4	4	4	4	3	3	3	2
Av.bir.wt.(lbs.)	48	75	69	52	66	63	69	77	54	87	58	69
Av. birth date	Apr.12	Mar.2	Apr.4	Feb.4	Feb.5	Feb.20	Feb.21	Feb.21	Feb.22	Feb.24	Mar.16	Feb.17
Were calves creep fed?	No	No	No	No	No	No	No	No	No	No	No	No
Av.wt.6 mo.(lbs)	319	384	377	348	440	374	366	439	357	449	355	449
Av. wean. date	10-30	10-30	10-30	10-30	10-30	10-30	10-30	10-30	10-30	10-30	10-30	10-30
Av. wean. wt.	336	454	398	435	571	448	430	516	425	545		545
Av. wean. type score *	10.6	11.6	11.2	12.8	14.1	13.3	12.6	11.8	12.2	12.8		14.0

* 6-8 = Medium: 9-11 = Good, 12-14 = Choice.

PERFORMANCE OF COW HERDS. 1952 CALVES

Louisiana Station
Iberia Livestock Farm, Jeanerette

Line or group designation	Brahman-Angus	Africander-Angus	Brahman
Location	Jeanerette	Jeanerette	Jeanerette
Breed of sire	Brahman-Angus	Africander-Angus	Brahman
Breed of dam	Brahman-Angus	Africander-Angus	Brahman
No. cows bred	132	29	13
No. cows calving	85	15	7
No. calves raised	78	13	6
Av. inbr. , dams (%)	4.0	0.5	0
Av. inbr., calves (%)	3.2	11.1	0
Av. birth wt. (lbs.)	63	63	66
Av. birth date	2-16-52	2-21-52	2-12-52
Were calves creep fed?	No	No	No
Weaning date	10-8-52	10-8-52	10-8-52
Av. weaning wt.	446	398	440
Av. wean. type score *	68	66	67

* On scale with 100 as top possible score.

MARYLAND STATION

Submitted by J. E. Foster and W. W. Green, December 17, 1952

1. Project Title: C-14 A Study of Productiveness of Purebred Beef Cattle in Maryland.

2. Objectives:

(a) To study productiveness of existing or introduced stocks of beef cattle. Productive characteristics measured will include rate of gain, economy of gain, market type, carcass quality, fertility, longevity, adaptation to environmental conditions, and other factors affecting the utility value of beef cattle.

(b) To compare selective criteria (individual and pedigree) with actual performance of progeny.

(c) To evaluate breeding technics for small purebred herds under the varying conditions encountered in practice in purebred herds.

(d) To attempt to produce beef cattle with superior productive capacities by linebreeding and selection. (Using criteria of selection as developed in this project and by cooperating stations in this and other regions)

3. Accomplishments during year:

Cooperation is being maintained with the owners of the herd of purebred Aberdeen-Angus cattle mentioned last year. Birth weights of calves as well as semi-annual weights of all members of the herd have been secured during the past year. Estimated weights for 6, 12, 18 and 24 months have been calculated for all animals where possible. Little statistical work has been done on the data collected to date as the project is just coming to the point where sufficient data is being secured for analysis.

Birth and other weights are being secured from the University of Maryland Angus and Hereford herds. The body measurements as agreed upon by the technical committee are also being taken at the proper ages of these animals. The data on the weights and measurements are being accumulated and will continue to be taken until sufficient data has been gathered to justify analyses.

4. Future Plans:

Cooperation will be continued with the owner of this one herd on the present basis. Summarization of the data will proceed as rapidly as possible with the present staff.

5. Publications:

None.

6. Publications planned:

None.

1. Sub-Project C-14-a: Effects of Early Weaning on the Duration of Maternal Influences in Beef Calves.

2. Objectives:

(a) To attempt to develop a new technic for an earlier evaluation of feedlot performance, progeny testing, and genetic evaluation of beef animals.

(b) To develop sound feeding and management practices for beef calves weaned at an early age.

(c) To evaluate the calves' genetic ability to thrive under new systems of care.

3. Accomplishments during year:

The data for the first three year's work has been summarized. The results are essentially as follows:

Among the females, statistically significant differences in weight were found between weaning age groups at 146, 147, and 180 days of age. No statistically significant differences were found between years or breeds for the females or weaning age groups, years or breeds for the males at ages from birth to 370 days. Statistically significant differences were found between sexes in weight at 90, 118, 180, 258, 286, 314, and 370 days of age.

Differences between the sexes were found in growth rate. Females weaned at 90 days of age grew at essentially the same rate from 118 to 180 days of age as from 202 to 370 days of age while females weaned at 180 days of age grew more rapidly from 118 to 180 days than from 202 to 370 days. The reverse trend was noted in the steers. The standard errors of estimate for regressions of weight on age were much less for animals weaned at 90 days of age than those weaned at 180 days.

The average rate of gain per 28-day period was quite uniform from 118 to 370 days of age for the calves weaned at 90 days while the gains for the 180 day group were quite undulating. From a series of different types of study, it was found that the gain during a 28-day period was poorly correlated with the weight of the animal at the start of the period. The correlations between weight at the start of a period and gain during the period for the calves weaned at 90 and 180 days were 0.004 and 0.01 respectively (n = 228 and 144 resp.). The correlations between age at the start

of the period and gains during the period were - 0.007 and - 0.001 for the 90 and 180 day groups respectively. The correlations between age and weight were 0.87 and 0.78 for the early and late weaned calves, respectively.

Correlations between gain and consumption of total digestible nutrients were statistically significant in most cases.

Data on 62 calves has been secured over a period of three years and from the results to date, it appears the second objective of this sub-project has been successfully completed.

Work on objectives one and three were initiated at the start of the project and a number of full and half-sibs have been used to date. Genetic studies will be made on that data. Two sire progeny groups of Aberdeen-Angus cattle were placed on test during the past year. Five calves of one sire were weaned at 90 days of age and six at 180 days of age. Six calves per weaning age have been put on test for the second sire. These calves are being fed individually. The only change in feeding and management this year compared with former years is that after an age of 180 days, all calves receive a ration of one part hay and two parts of grain mixture combined as one feed.

4. Future Plans:

Plans for the coming year include the completion of the feeding trials underway at the present time, the putting on trial of two or three sire progeny groups in the spring and summer of 1953, and the initiation of genetic studies on the data collected to date.

5. Publications:

Publication of the results of the first three years' work on the project. (In abstract form, Jour. An. Sci. 11:737-738, 1952.)

1. Sub-Project C-14-b: Type Classification as an Aid in Selection of Beef Breeding Cattle.

2. Objective:

To determine the value of type classification in beef cattle, i.e., heritability of beef type and production.

3. Accomplishments during year:

Two herds have been classified twice each during the year. (The same herds as classified last year.) No new analysis of the data was undertaken.

4. Future Plans:

Classification will be continued on a semi-annual basis on as many herds as possible. Additional analysis of the data will be done as assistance is provided.

5. Publications:

None.

6. Publications Planned:

None.

POSTWEANING PERFORMANCE OF 1951 CALVES FULL FED AFTER WEANING

	Maryland Station	
Line or group designation	Univ. of Md.	Univ. of Md.
Location	Univ. of Md.	Univ. of Md.
Breeding of calves	Aberdeen-Angus	Hereford
Av. inbreeding (%)	Outbred herd	Outbred herd
Steers, No.	14	1
Av. weaning wt. *	342	475
Av. 12 month wt.	659	810
Length of feeding period	190	190
Feed per cwt. gain (lbs.)	807	791
Concentrates	520	528
Roughage	287	263
Av. daily gain on test	1.67	1.67
Av. type score (12 mo.) **	12 (low choice)	14 (high choice)
Heifers, No.	3	5
Av. weaning wt. *	330	344
Av. 12 month wt.	592	582
Length of feeding period	190	190
Feed per cwt. gain (lbs.)	857	886
Concentrates	557	545
Roughage	300	341
Av. daily gain on test	1.37	1.34
Av. type score (12 mo.)	11 (high good)	11 (high good)

* At 180 days.

** Slaughter data for the 1951 calves were secured from eleven of the fifteen steers fed individually. Seven carcasses were graded U. S. Prime and four U. S. Choice. Dressing percentages based on live weight at College Park and cold carcass weight at Baltimore ranged from 56.7 to 63.0 per cent, with an average of 59.1 per cent.

PERFORMANCE OF COW HERDS. 1952 CALVES

Maryland Station

Line or group designation	Univ. of Md.	Univ. of Md.
Location	Univ. of Md.	Univ. of Md.
Breed of sire	Aberdeen-Angus	Hereford
Breed of dam	Aberdeen-Angus	Hereford
No. cows bred	24	15
No. cows calving	22	12
No. calves raised	20 (1 twin)	11
Av. inbr. of dams (%)	Outbred herd	Outbred herd
Av. inbr. of calves (%)	Outbred herd	Outbred herd
Av. birth wt. (lbs.)	60	65
Av. birth date	2/28/52	3/4/52
Were calves creep fed?	No	No
Av. wt. at 6 mo. (lbs.)	364	342
Av. weaning date	8/26/52*	8/31/52
Av. weaning wt. *	364	342
Av. weaning type score **	13	12
Av. wean. cond. score **	12	11

* For calves if weaned at 6 months; 6 were weaned at 90 days.

** 6-8 = Medium, 9-11 = Good, 12-14 = Choice.

NORTH CAROLINA STATION

Submitted by H. A. Stewart, December 31, 1952

1. Project Title: State 74-Ai28 The Improvement of Beef Cattle Through Breeding Methods.

   State 46-Ai17 The Development of Beef Cattle Especially Adapted to the Coastal Plains Region of North Carolina and Similar Areas.

2. Objectives:

   (a) To compare groups of cattle from different topcrosses on grade Hereford cows and F_2 generations from them for their adaptatility under Coastal Plains conditions.

   (b) To establish breeding groups of cattle from topcrosses of Brahman and Africander breeding to grade Hereford and Angus cows.

   (c) To obtain information on the feedlot performance of purebred Hereford, Angus and Shorthorn bulls and heifers and on prospective Brahman-Hereford F_2 and Africander-Hereford F_2 herd bulls.

   (d) To further assess the Romo Sinuano breeding introduced in 1948 and 1949.

   (e) To continue the study of total performance of the progeny of bulls used in the same herd the same year.

3. Accomplishments during year:

   Fifteen bulls and 13 heifers were fed 168 and 233 days respectively for information on postweaning rate of gain. A comparison of the progeny of 2 Hereford bulls showed an average difference of 22 pounds per bull calf and 18 pounds per heifer during the feeding periods.

   Evidence as indicated by the mean performance of bull progenies as well as a rather complete analysis of some data show differences between bulls used randomly on cows in the same herd the same year. This evidence points toward possible bull differences in progeny gains during the suckling period as well as during the postweaning feeding period. These sire effects are continued into the offspring of this generation where calf weaned weights appear to reflect the sire differences between progeny groups of cows.

   Three of the Romo Sinuano x Hereford crossbred females calved in the spring of 1952. One was a 3-year-old, the others 2 years. All had heifer calves. The weights on the 2 calves that have reached 6 months of age are 435 and 385 pounds. The 3-year-old cow weighs 1380 and the 2-year-olds average about 1000 pounds. The 2-year-old bulls weigh from 1100 to over 1400 pounds. These cattle are the

most docile cattle to handle that we have seen. They do not become excited when cornered. Unbroken calves can be haltered and measured with no jumping and kicking.

Grade Hereford, Brahman x Hereford crossbred, Africander Angus Hereford F_2, and Brahman x Hereford F_2 calves were produced on the Coastal Plains forest range. Grade Hereford cows producing either grade Hereford or Brahman x Hereford crossbred calves have not produced as many, or weaned as heavy, calves as either the Brahman x Hereford or Africander x Hereford crossbred cows.

1952 Calving Performance by Breeding of Calves

	Breeding of Calves Produced			
	Grade Hereford	Brahman x Hereford F_1	Brahman x Hereford F_2	Africander Angus x Hereford F_2
No. of cows bred	25	16	21	13
No. of cows calving	12	8	14	8
No. of live calves	12	7	13	7
% Calf crop 1952	48	44	62	64
% Calf crop 1951	55		50	82
Av. birth weight	67.5	70.5	60.2	58.5
Av. wt. 6 mos.				
1952 calves	226	294	325	321
1951 calves	222	286	323	300

Cow and Calf Performance at Upper Mountain Experiment Station

	1947	1948	1949	1950	1951	1952
Total calf wts. at 182 days	8262	8213	10442	10863	13010	12680
Av. calf wt. at 182 days	344.2	357.1	360.0	339.5	371.7	342.7
No. cows in herd	27	23	30	35	41	37
No. calves dropped	24	23	29	35	37	37
Percent calf crop dropped	88.9	100	96.7	100	90.2	100
No. calves weaned	24	23	29	32	35	37
Percent calf crop weaned	88.9	100	96.7	91.4	85.4	100

Total wt. of calves at 182 days	63,470
Av. wt. of calves at 182 days	352.61 lbs.
Total no. of cows	193
Total no. of calves dropped	185
Percent calf crop dropped	95.85%
Total no. of calves weaned	180
Percent calf crop weaned	93.26%

North Carolina Station (continued)

Five 2-year-old heifers have been added to the purebred herds through purchase. All purebred heifers have been retained. Four Hereford bull calves were purchased to be fed with purebred bulls calved in the herds.

Eight Hereford and 3 Angus bull calves, and 11 Hereford, 4 Angus and 1 Shorthorn heifer calves were started on rate of gain trials in September. These animals are fed together by sex groups. The bull group is essentially self-fed, while the heifers are limited so that their gains will be about $1\frac{1}{4}$ to $1\frac{1}{2}$ pounds per day. Both groups have access to pasture and hay. The feed mixture and analysis are:

Feed Mixture		Feed Analysis	
Cracked corn	200 lbs.	Dry matter	91.41 per cent
Ground oats	75 lbs.	Ash	4.12 per cent
Alfalfa leaf meal	50 lbs.	Crude protein	14.33 per cent
Cottonseed hulls (treated with molasses)	100 lbs.	Crude fat	3.58 per cent
		Crude fiber	11.26 per cent
Soybean oil meal	75 lbs.	Nitrogen-free extract	58.12 per cent
Salt	$2\frac{1}{2}$ lbs.		

Four of the purebred Hereford bull calves from the 1951-52 feeding trial were used on grade cows, 2 at each of 2 outlying stations. Breeding performance of all 4 bulls was satisfactory.

4. Future Plans:

Feedlot testing is being continued on all bull calves at Raleigh, including prospective herd sires from the various crossbred groups.

Sample steer progenies from the tested bulls used on grade herds will continue to be fed for slaughter grade and carcass evaluation. Heifer gains on pastures will be compared to the feedlot gains of their steer mates.

Inter se matings will be continued within each of the three groups: Brahman-Hereford; Africander-Hereford-Angus; and, Romo Sinuano-Hereford. Selections within these groups will be based on reproductive performance, rate of gain and carcass quality.

5. Publications:

Stewart, H. A. Breeding Productive Beef Cattle. N. C. Agric. Expt. Sta. Report 15, Oct. 1952.

Johnson, J. C. Jr. The Construction of a Ewe Selection Index for Market Lamb Production. (Paper given 1953 meeting Assn. South Agr. Workers.)

North Carolina Station (continued)

6. Publications Planned:

Beef Cattle Breeding Research in North Carolina, N. C. Expt. Station Quarterly, Research and Farming.

POSTWEANING PERFORMANCE OF 1951 CALVES FULL FED AFTER WEANING ON PASTURE

North Carolina Station

Line or group designation	Heref.	Angus	S'horn	Br.x H.	Af.x H.
Location	Raleigh	Raleigh	Raleigh	Raleigh	Raleigh
Breeding of calves	PB Heref.	PB Angus	PB S'horn		
Bulls, No.	5	4	3	1	2
Av. weaning wt.	548	622	443	480	408
Length of feeding period	168	168	168	168	168
Feed per cwt. gain (lbs.)					
Concentrates	722	Fed together			
Roughage	130	on pasture			
Av. daily gain on test	1.84	1.70	1.75	1.32	1.50
Heifers, No.	10	2	1		
Av. weaning wt.	540	445	440		
Length of feeding period	233	233	233		
Feed per cwt. gain (lbs.)					
Concentrates	978	Fed together			
Roughage	244	on pasture			
Av. daily gain on test	1.18	1.18	1.29		

PRODUCTION AND/OR SLAUGHTER DATA ON YEARLING AND OLDER CATTLE NOT INCLUDED IN BREEDING HERDS IN 1952

North Carolina Station

	Tidewater Exp. Sta.		Upper Mountain Exp. Sta.	
Line or group designation	Gr. Here.	Gr. Here.	Black	65
Breeding:	Bull 70	Bull 73	Gr. Here.	Gr. Here.
Sex	Steers	Steers	Steers	Steers
No.	2	2	9	4
Av. age (fall 1951)	236	220	263	243
Av. wt. (fall 1951)	358	385	462	434
Av. winter gain	152	170	139	174
Days on pasture	212	212	193	193
Av. gain on pasture	138	138	250	295
Days on feed	77	77	on pasture	on pasture
Av. gain on feed	130	115	-	-
Animals slaughtered:				
Av. age at slaughter	23 mo.	22.5 mo	-	-
Av. slaughter wt.	735	762	851	902
* Av. slaughter grade	8	7	10	10
Av. dressing percent	55.9	55.6	54.9	54.5
* Av. carcass grade	7	7	11	11

* 6-8 = Med. or Com.; 9-11 = Good; 12-14 = Choice.

PERFORMANCE OF COW HERDS. 1952 CALVES

North Carolina Station

Line or group designation	PB Hereford	Angus	Shorthorn	Gr. Hereford	Gr. Hereford x Romo-Sinuano
Location	Raleigh	Raleigh	Raleigh	Raleigh	Raleigh
Breed of sire	Hereford	Hereford	Shorthorn	Hereford	Gr.Here.x Romo-Sin.
Breed of dam	Hereford	Hereford	Shorthorn	Gr. Here.	Gr.Here.x Romo-Sin.
No. cows bred	29	8	6	28	3
No. cows calving	19	8	3	22	3
No. calves raised	17	7	3	21	3
Av. birth wt. (lbs.)	61	57	58	64	64
Av. birth date	1-25-52	1-17-52	3-3-52	2-16-52	1-24-52
Were calves creep fed?	Yes	Yes	Yes	No	No
Av. wt. 6 mo. (lbs.)	373	408	395	364	398
Av. weaning date	9-22-52	9-14-52	9-30-52	9-29-52	9-30-52
Av. weaning weight	512	537	420	486	500
Av. wean. type score	13	10	11	No score	9

PERFORMANCE OF COW HERDS. 1952 CALVES

North Carolina Station

Line or group designation	Hereford	Hereford	Hereford	Hereford	Hereford
Location	Tidewater	Tidewater	Upper Mtn.	Upper Mtn.	Upper Mtn.
Breed of sire	Hereford (80)	Hereford (82)	Hereford (77)	Hereford (83)	Hereford (B)
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford
No. cows bred	22	19	14	14	9
No. cows calving	22	19	14	14	9
No. calves raised	22	17	14	14	9
Av. birth wt. (lbs.)	67	68	73	74	59
Av. birth date	3-15-52	3-20-52	2-10-52	2-5-52	1-18-52
Were calves creep fed?	No	No	Yes	Yes	No
Av. wt. 6 mo. (lbs.)	296	297	355	356	293
Av. weaning date	11-6-52	11-6-52	9-1-52	8-29-52	8-21-52
Av. weaning wt.	358	348	393	405	333
Av. wean. type score	12.0	11.5*	11.7	12.1	10.7

* Feeder grade.

SOUTH CAROLINA STATION

Submitted by E. G. Godbey, December 30, 1952

1. Project Title: The Use of Brahman and Certain British Breeds of Beef Cattle in the Production of Fat Calves.

2. Objectives:

The objectives of this test were to determine the birth and weaning weights, market grades, carcass grades and dressing percentages of fat calves sired by Brahman, Hereford and Angus bulls. The calves at the Coast Station were out of purebred Angus cows and those at the college were out of purebred Hereford cows.

3. Accomplishments during year:

(a) Facilities and cattle acquired: The cow herds have been the same as those used in previous years. A few heifers have been added to the test. One Hereford and one Angus bull were purchased for the work at the college.

(b) Research results: Results secured in these tests are shown in the accompanying tables. The purebred Hereford calves at the college were heavier at birth than those in either of the crossbred groups. However, the Brahman-Hereford crossbreds were slightly heavier at weaning. As in previous years, in the work at the Coast Station the Brahman-Angus calves were considerably heavier than the other groups at birth. However, the differences between the calves sired by the Brahman and Hereford bulls were not very great at weaning age. According to the recorded grades, the least desirable carcasses were produced by the Brahman-Angus calves.

4. Future Plans:

The crossbreeding work will be continued at the college. The work at the coast station will be closed and a test in which a Shorthorn bull is used on crossbred heifers will be started. It is also planned to do some crossbreeding work in which a Santa Gertrudis bull is used on Angus cows.

5. Publications:

Results have been published in the South Carolina Experiment Station Report.

6. Publications planned:

There are no other publications planned at this time.

PERFORMANCE OF COW HERDS. 1952 CALVES

South Carolina Station

Line or group designation	Purebred	X bred	X bred	Purebred	X bred	X bred
Location	Coast Sta.	Coast Sta.	Coast Sta.	Clemson	Clemson	Clemson
Breed of sire	Angus	Brahman	Hereford	Hereford	Angus	Brahman
Breed of dam	Angus	Angus	Angus	Hereford	Hereford	Hereford
No. cows bred	20	22	14	14	12	14
No. cows calving	20	22	14	14	7	14
No. calves raised	20	20	13	14	7	11
Av. birth wt. (lbs.)	62	86	69	85	74	76
Av. birth date	2/23/52	2/20/52	3/7/52	2/23/52	2/21/52	2/6/52
Were calves creep fed?	Yes	Yes	Yes	Yes	Yes	Yes
Av. weaning date	9/20/52	9/17/52	10/3/52	9/20/52	9/18/52	9/3/52
Av. weaning wt. (7 mo.)	477	565	524	483	467	486
Calves slaughtered at weaning:						
1. Steer calves, no. animals	9	9	4	8	2	6
Av. wt.	466	576	537	479	522	488
Av. slaughter grade	15.3 (M G.)	15.1 (M.G.)	14.2 (H.G.)	17.0 (L.G.)	15.7 (M.G.)	18.6 (L.G.)
Av. dressing percent	58.7	59.2	60.9	55.2	56.3	58.2
Av. carcass grade	14.4 (H.G.)	14.4 (H.G.)	11.3 (L.C.)	16.4 (M.G.)	13.0 (H.G.)	15.3 (M.G.)
2. Heifer calves, no. animals		4 *				
Av. wt.	Not	526	Not	Not	Not	Not
Av. slaughter grade	Slaughtered	15.3 (M.G.)	Slaughtered	Slaughtered	Slaughtered	Slaughtered
Av. dressing percent		60.1				
Av. carcass grade		14.4 (H.G.)				

* Others kept for breeding work.

TENNESSEE STATION

Submitted by Charles S. Hobbs and H. J. Smith, December 1952

1. Project Title: The Improvement of the Producing Ability of Beef Cattle.

2. Objectives:

(a) To develop lines, or line crosses, or combinations of lines and crosses of beef cattle that will make the most efficient use of Tennessee pastures and forages and that will result in an improvement of such characters as rate of gain, economy of gain, carcass quality, fertility and longevity.

(b) To investigate the productiveness of existing lines of beef cattle.

(c) To develop effective breeding techniques for improving the productiveness of existing lines of beef cattle.

(d) To study the effect of different levels of nutrition on the development of type, conformation, economy of gain, fertility, and longevity.

3. Accomplishments during year:

(a) Facilities and cattle acquired: Beef cattle breeding research under S-10 at the Tennessee station includes herds at Knoxville, Greeneville, Crossville, Columbia, Springfield and Oak Ridge. The expansion of the cow herds to be used in developing lines was continued at all stations with the addition of replacements from respective or other herds and the purchase of purebred animals.

Eighty purebred Hereford cows were purchased during 1952 and added to the breeding projects at Columbia, Greeneville, and Knoxville.

Columbia: The grade Hereford herd of approximately 60 cows at this station was replaced with 40 head of purebred cows obtained from the Oasis Cattle Company, Canadian, Texas. This herd will be expanded to about 60 animals.

Greeneville: Twenty-eight head of purebred cows were added to the herd at this station during 1952. Ten bred cows were purchased from the Wyoming Hereford Ranch and 18 cows from the Oasis Cattle Company. Twenty-six head of grade cows were transferred to the Oak Ridge station to be used in the line evaluation and testing project at that station.

Springfield: Ten purebred Hereford cows were purchased from the Wyoming Hereford Ranch and added to the herd at this station during 1952.

Oak Ridge: Twenty-six grade cows from the Greeneville station which were replaced with purebreds were added to the grade herd to be used in the line evaluation project. Three purebred Hereford cows were purchased and added to the herd. Plans include replacing this grade herd with purebreds as quickly as time and funds permit.

Knoxville: Three Hereford and 3 Angus heifer calves were purchased for the level of feeding study and will be retained for the breeding herds.

(b) 1. Sire Testing Studies: During the fall and winter of 1951-52, the Tennessee station fed 12 Hereford bulls and I Angus bull under test conditions in a single group for 139 days on a ground mixed tation.

Twenty-seven steers by 5 bulls were fed by allotting uniformly across a winter pasture experiment involving 3 treatments. The performance of these bulls and steers is shown in the accompanying tables.

2. Level of Feeding Studies: The study on the effect of level of nutrition on the development of type, conformation, economy of gain, fertility and longevity was continued during 1952. Details of the procedures being used in the conduct of this experiment were given in the 1951 S-10 Annual Report. Briefly, trios of heifer calves are being fed on three different nutritional regimes: (1) nurse cow plus a full feed of concentrates and hay, (2) full feed of concentrates and hay, and (3) customary practices for good commercial production. Growth and developmental phases to 18 months of age were completed on two Angus heifer trios. Four Hereford and two Angus heifer trios were started on test in 1952. Weights, type grades and body measurements of trios completing growth tests in 1951 are shown in Table I.

3. The photographic chute was used routinely to obtain photographic records and measurement data on all purebred animals in the breeding projects at all stations.

4. Performance of the cow herds at the main and branch stations for 1952 is shown in the accompanying tables. Type and condition scores are reported as recommended by the Committee on Methods and Measurement.

4. Future Plans:

(a) Continue the program of performance testing young bulls from herds in the project. During the fall and winter of 1952-53 a total of 31 bull calves (27 Hereford, 4 Angus) are being individually self-fed on a ground mixed ration at the Oak Ridge Station. These include 10 bulls from Springfield, 4 from Crossville, 7 from Greeneville, 3 from Alcoa-Knoxville, 3 from Knoxville and 2 from Oak Ridge.

(b) Continue the progeny testing of sires to be used in the breeding program.

(c) Continue the expansion of herds at Greeneville, Springfield, Crossville and Columbia.

(d) Continue the level of feeding studies.

(e) Continue the study on objective methods of obtaining linear measurements of beef cattle.

(f) Continue analysis and study of cow performance records at stations where such records have accumulated over a period of years.

(g) Initiate line evaluation projects at Oak Ridge and Ames Plantation.

5. Publications:

No publications were issued during 1952.

6. Publications Planned:

Results of analysis of cow performance records.

Table 1. Weights, Type Grades and Body Measurements of Trio Calves at 28 Months of age. 1/

Nutritional Regime *	Weight Lbs.	Type Grade 2/	Body Measurements: Height of Withers cm	Depth of Chest cm	Length of Body cm	Width of Cannon Bone cm
A- Nurse cow plus a full feed of concentrates and hay	1045	13.0	115	67	131	7.2
B- Full feed of concentrates and hay	925 3/	12.6	112	64	127	6.7
C- Customary practices for good commercial production	1047	12.5	114	63	128	6.8

1/ Includes four trios only - (3 heifers and 1 bull).
2/ 14 = high choice; 13 = choice; 12 = low choice; 11 = high good.
3/ Includes one heifer which weighed only 775 pounds at 28 months.
* Fed in this manner from about 4 to 18 months of age. Thereafter handled the same with rest of herd.

POSTWEANING PERFORMANCE OF 1951 CALVES FULL FED AFTER WEANING

Tennessee Station

Line or group designation	Sire Testing				
Breeding of calves	PB Here.& Ang.				
Bulls, No.	13 (12 Here. 1 Ang.)				
Av. initial wt.	528 (363-900)				
Av. final wt.	869 (681-1190)				
Length of feeding period	139				
Feed per cwt. gain (lbs)	823				
Concentrates	411.5				
Roughage	411.5				
Av. daily gain on test	2.45 (1.71-3.08)				
* Av. type score (12 mo.)	11				
Steers, No.	6	3	6	6	6
Steers sired by	WHR Worthy Duke (Hereford)	Noes Baca Duke (Hereford) 31	UT Blackoak 2 (Angus)	Bandolier (Angus)	Waverley's Temp. (Shorthorn)
Av. initial wt.	400	470	502	556	496
Av. final wt.	674	751	744	783	750
Length of feeding period	137	137	137	137	137
** Feed per cwt. gain (lbs)					
Concentrates					
Roughage					
Av. daily gain on test	2.00	2.06	1.76	1.66	1.86
* Av. type score (12 mo.)	12	11	11.5	11.5	10

* Good = 9-11; Choice = 12-14; Fancy or Prime = 15-17.

** Steers were allotted across winter pasture experiments. Lot 1 - winter pasture, hay and 5 lbs. grain; Lot 2 - winter pasture and hay; Lot 3 - barn, hay and 5 lbs. grain.

PERFORMANCE OF COW HERDS. 1952 CALVES

Tennessee Station

Line or group designation	Sire Testing	Sire Testing	WHR	Sire Testing	Sire Testing
Location	Greeneville	Greeneville	Greeneville	Alcoa	Alcoa
Breed of sire	Hereford (WHR Worthy Duke)	Hereford (Noes Baca Duke 117)	Hereford (WHR bulls)	Hereford (Sensation Domino)	Hereford (Imperial Mischief)
Breed of dam	PB. & Gr. Her.	PB & Gr. Her.	Hereford	Hereford	Hereford
No. cows bred	24	24	9	50	39
No. cows calving	18	16	9	47	14
No. calves raised	18	16	9	47	11
Av. birth wt. (lbs.)	74	72	63	60	69
Av. birth date	2-17-52	3-9-52	5-25-52	3-31-52	3-31-52
Were calves creep fed?	No	No	No	No	No
Av. wt. at 6 mo. (lbs.)	431*	441*	326	323	342
Av. weaning date	11-5-52	11-5-52	11-5-52	10-30-52	10-30-52
Av. weaning wt.	559	509	303	371	392
Av. wean. type score ***	12.3	12.4	13.2	**	**
Av. wean. cond. score. ***	10.8	10.6	7.7	**	**

* Av. weight at 7 months. ** Calves were not graded due to sickness.
*** Good = 9-11; Choice = 12-14; Fancy or Prime 15-17.

PERFORMANCE OF COW HERDS. 1952 CALVES

Tennessee Station

Line of group designation	McCroskey	Pridemar	Gr. Angus	Gr.Her.x Sh.	Hereford	Hereford
Location	Crossville	Crossville	Crossville	Crossville	Springfield	Springfield
Breed of sire	Ang.(General of Macmor 206	Ang. (UT Blackoak 2)	Ang.(UT Eppy UT Blackoak)	Sh.(Waverly's Templar,OW Larry Dom.4)	Her. (Noes Baca Duke 31)	Hereford (WHR bulls)
Breed of dam	Angus	Angus	Gr. Angus	Gr.Her.x Sh.	Hereford	Hereford
No. cows bred	14	20	19	29	13	10
No. cows calving	12	17	19	27	11	8
No. calves raised	11	17	17	25	9	8
Av. birth wt. (lbs.)	60	60	62	71	81	72
Av. birth date	5-27-52	3-24-52	4-17-52	4-30-52	5-15-52	5-7-52
Were calves creep fed?	No	No	No	No	No	Yes
Av. wt. 6 mo. (lbs.)	345	342	389	429	410	374
Av. weaning date	11-4-52	11-4-52	11-4-52	11-4-52	11-5-52	11-5-52
Av. weaning wt.	295	390	420	443	404	376
Av. wean. type score	11.3	12.3	12.1	11.7	13.6	13.9
Av. wean. cond. score	9.8	9.3	11.0	11.0	10.9	12.0

PERFORMANCE OF COW HERDS - FALL 1951

Tennessee Station
Oak Ridge

Breed of sire	Polled Hereford	Grade Hereford	Polled Hereford	Polled Hereford
Sire no. or name	- 3	5	238	Pal
Breed of dam	Hereford	Hereford	Hereford	Hereford
No. cows bred	9	7*	2	4
No. cows calving	9	5	2	4
No. calves raised	9	5	2	4
Av. birth wt. (lbs.)	73	60	66	80
Av. birth date	9-29-51	10-1-51	10-25-51	10-27-51
Were calves creep fed?	No	No	No	No
Av. wt. at 6 mo.	-	-	-	-
Av. weaning date	6-11-52	6-11-52	6-11-52	6-11-52
Av. weaning wt. **	(8) 560	(3) 490	(2) 491	(4) 520
Av. weaning type score	(4) 11.2 (HG+)	-	13.0 (C)	(3) 11.0 (HG)
Av. weaning cond. score	(4) 10.5 (G+)	-	10.5 (G+)	(3) 10.3 (G+)

* 2 abortions.
** Numbers in parenthesis refer to number of calves on which average is based.

PERFORMANCE OF COW HERDS. 1952 SPRING CALVES

				Tennessee Station Oak Ridge
Breed of sire	Polled Hereford	Polled Hereford	Polled Hereford	Polled Hereford
Sire no. or name	- 3	238	246	Pal
Breed of dam	Hereford	Hereford	Hereford	Hereford
No. cows bred	24	17	27*	7
No. cows calving	22	16	20 (21 calves)	7
No. calves raised	21	15	19	7
Av. birth wt. (lbs.)	74	71	72	72
Av. birth date	3-9-52	3-15-52	3-1-52	3-5-52
Were calves creep fed?	No	No	No	No
** Av. wt. 187 days (lbs.)	(15) 439	(13) 450	(17) 436	(5) 410
Av. weaning date	11-5-52	11-5-52	11-5-52	11-5-52
Av. weaning wt.	(15) 554	(13) 534	(17) 557	(5) 505
Av. weaning type score	(16) 11.3 (HG+)	(13) 12.0 (LC)	(16) 11.8 (LC-)	(5) 10.4 (G+)
Av. weaning cond. score	(16) 11.2 (HG+)	(13) 11.2 (HG+)	(16) 11.4 (HG+)	(5) 10.4 (G+)

* 3 of these cows aborted.
** Numbers in parenthesis refer to number of calves on which average is based.

TEXAS STATION

Submitted by Bruce L. Warwick, T. C. Cartwright, H. O. Kunkel,
J. J. Bayles and L. A. Maddox, January 2, 1953

1. Project Title: This work is supported by three Texas State Projects. The first of these, R-M 607 "Improvement of Beef Cattle Through Selection of Performance-Tested and Progeny-Tested Sires" is in progress at Balmorhea, McGregor, and Panhandle, Texas.

2. Objectives:

   (a) To determine the heritability of gain and other economic characteristics as beef conformation, quality of fleshing, earliness of maturity and size of animal.

   (b) To study the effects of the application of such information on the improvement of breeding herds.

   (c) To determine the mode of inheritance of the pigmentation of the eyelids and to determine the relationship of eyelid pigmentation to "cancer eye".

   (d) To make a more detailed analysis of the existing data resulting from the previous work that has been carried out under Texas Experiment Station Project 550.

   (e) To determine suitable and economical rations of locally grown feeds and supplements for proper development of young breeding stock in conjunction with Texas Station Project 550.

3. Accomplishments during year:

   Evaluation of calves for gaining ability when self-fed on ground mixed growing rations in the feedlot was conducted at Balmorhea, Panhandle and McGregor, Texas. Of the 646 head tested at these three points, 411 were raised and owned by cooperators. The other 235 were raised by the Texas Station on experiment R-M 650 listed below, and the results were used directly for selection of individuals and of sires. There was great variability between sire groups and between individuals. Two sires represented by progeny at McGregor were the highest gaining bulls in the 1948-49 test at Balmorhea. Of the 8 bull calves sired by these, six were in the top 25 per cent and all were above average. Only one bull calf sired by these bulls in the last two tests has had below the respective average gain of the breed and sex. Additional high gaining sires have been secured on loan by the station and their progenies will be tested in the future. The results of the tests are being used for selection purposes by private breeders as well as in the station herds. Attached are "Post Weaning Performance of 1951 calves, full fed after weaning" for the tests at McGregor, Panhandle and Balmorhea.

Texas Station (continued)

The following notes on Balmorhea work are by Mr. Bayles:

Balmorhea, Texas:

1. Objectives:

The principal purpose of the beef cattle testing program at the Balmorhea Station is to aid in the selection of the superior lines of breeding for the breeds used. The aim is to develop the lines having superior gaining ability combined with desirable beef conformation.

2. Accomplishments during year:

During the year 1951-52 a total of 172 head of purebred beef cattle were tested in the station feedlots. These cattle had been topped from the herds of 15 cooperating ranchmen breeders.

(a) Facilities are available for handling 200 to 225 head of cattle in the feedlots.

(b) Work over the past 10 years has shown wide differences in gaining ability of different groups and individuals in beef cattle. Several of these lines of breeding are being used for foundation stock by Experiment Stations and private breeders.

3. Future Plans:

Plans for future work contemplate expansion of the work to include more cooperating breeders and also refinements in procedures.

4. Publications:

Results of the work for the year were published in mimeographed form and distributed to a crowd of 600 visiting farm and ranch people at a Field Day meeting held at the clost of the test. The results have also been presented at other meetings of ranchmen and teachers of vocational agriculture.

5. Publications Planned:

A summary of the work for the past 10 years is in process of publication and will be distributed as a station bulletin when available.

POSTWEANING PERFORMANCE OF 1951 CALVES FULL FED AFTER WEANING

Texas Station
Balmorhea

Calves owned by cooperators.

Line or group designation	Hereford	Santa Gertrudis	Galloway
Bulls			
No.	98	22	3
Length of feeding period	138	138	138
Feed per cwt. gain (lbs.)	938	1072	805
Concentrates	143	127	120
Roughage	795	945	685
Av. daily gain on test	2.15	2.46	2.51
* Av. type score (12 mo.)	13.8	16.4	14.7
Highest daily gain	2.84 **	3.09	2.68
Lowest daily gain	1.23	1.76	2.36
Heifers			
No.	43	6	
Length of feeding period	138	138	
Feed per cwt. gain (lbs.)	1084	1098	
Concentrates	173	130	
Roughage	911	968	
Av. daily gain on test	1.73	2.33	
Av. type score (12 mo.)	13.0	14.0	
Highest daily gain	2.23 **	2.72	
Lowest daily gain	1.14	2.09	

* Unless indicated otherwise, the type scores and carcass grades in the Texas report are according to the following scale: 2-6 = Prime or Fancy; 8-12 = Choice; 14-18 = Good.

** Highest individual.

POSTWEANING PERFORMANCE OF 1951 CALVES FULL FED AFTER WEANING

1951-52 Test
Calves owned by cooperators.

Texas Station
Pan Tech Farms

Breeding of calves	All Hereford and Angus	Hereford	Angus
Bulls			
No.	131	116	15
Av. init. wt. (11-20-51)	574	582	517
Av. final wt. (4-8-52)	936	944	874
Length of feeding period	140	140	140
Feed per cwt. gain (lbs)[2]	785		
Concentrates	241		
Roughage	544		
Av. daily gain on test	2.58	2.59	2.55
Initial grade [1]	12.7	12.7	12.9
Final grade [1]	12.7	12.5	12.0
Highest daily gain	3.50	3.50	2.98
Lowest daily gain	1.34	1.34	1.94
Heifers			
No.	30	28	2
Av. init. wt. (11-20-51)	508	504	572
Av. final wt. (4-8-52)	780	781	776
Length of feeding period[3]	140	140	112
Feed per cwt. gain (lbs)[2]	962		
Concentrates	295		
Roughage	667		
Av. daily gain on test	1.98	1.99	1.82
Initial grade [1]	13.1	13.1	
Final grade [1]	12.8	12.8	11.7
Highest daily gain	2.51	2.51	2.03
Lowest daily gain	1.58	1.58	1.60

1 Grades of 8-12 Choice; 12.1-16 Good; 16.1 and over Medium.

2. The ration for this test was as follows:

Cane fodder	25%
Hegari fodder	25%
Alfalfa hay	20%
C/S/M	15%
Hegari grain	15%

3 The two Angus heifers were not started on feed until December 18, 1951.

POSTWEANING PERFORMANCE OF 1951 CALVES FULL FED AFTER WEANING

All calves on test, 1951-52.

Texas Station
Bluebonnet Farm (1)*

Line or group designation	Registered Herefords	Registered Brahmans	F_1 Hereford x Brahman	Unregistered Herefords	Registered Angus	Registered Shorthorns	Eligible to registration, Santa Gertrudis	F_1 Hereford x Brahman (2)	Herefords (2)
Breeding of calves	Hereford	Brahman	F_1	Hereford	Angus	Shorthorn	Santa Gertrudis	F_1	Hereford
Bulls, No.	38	20	21	None	4	3	3	None	None
Av. wt. 12-17-51	573	486	600		630	680	842		
Av. wt. 5-19-52	920	787	966		965	1048	1207		
Length of feeding period	154	154	154		154	154	154		
Feed per cwt. gain (lbs)	926	883	996		1017	1062	1190		
Concentrates	324	309	349		356	372	416		
Roughage	602	574	647		661	690	774		
Av. daily gain on test	2.2	2.0	2.4		2.2	2.4	2.4		
Highest da. ga. on test	2.9	2.4	2.7		2.3	2.6	2.6		
Lowest da. ga. on test	1.7	1.4	1.8		2.0	2.3	2.0		
Steers, No.	None	None	22	11	None	None	None	41	11
Av. weaning wt.			546	462				531	509
Av. 12 month wt.			812	739				856	814
Length of feeding period			154	154				154	154
Feed per cwt. gain (lbs)			1190	1045				940	1001
Concentrates			416	366				329	350
Roughage			774	679				611	651
Av. daily gain on test			1.7	1.8				2.1	2.0
Highest da. ga. on test			2.2	2.2				2.6	2.1
Lowest da. ga. on test			1.4	1.6				1.4	1.7
Heifers, No.	19	15	78	27	None	None	None	None	None
Av. wt. 12-17-51	476	405	516	439					
Av. wt. 5-19-52	733	617	739	680					
Length of feeding period	154	154	154	154					
Feed per cwt. gain (lbs)	1100	1095	1299	1102					
Concentrates	385	383	455	386					
Roughage	715	712	844	716					
Av. daily gain on test	1.7	1.4	1.5	1.6					
Highest da. ga. on test	2.1	1.6	2.1	1.8					
Lowest da. ga. on test	1.2	1.0	.8	1.2					

* See third page following for footnotes.

POSTWEANING PERFORMANCE OF 1951 CALVES FULL FED AFTER WEANING

1951-52 Test
Calves raised and owned by Texas Station

Texas Station
Bluebonnet Farm

Line or group designation	Registered Hereford	Registered Brahmans	F_1 Hereford x Brahman	Unregistered Herefords	F_1 Hereford x Brahman (2)	Herefords (2)*
Breeding of calves	Hereford	Brahman	F_1	Hereford	F_1	Hereford
Bulls, No.	8	2	21	None	None	None
Av. wt. 12-17-51	516	458	600			
Av. wt. 5-19-52	913	755	966			
Length of feeding period	154	154	154			
Feed per cwt. gain (lbs.)	Fed in pens		996			
Concentrates	mixed with		349			
Roughages	cooperator's calves		647			
Av. daily gain on test	2.6	1.9	2.4			
Highest daily gain on test	2.8	2.0	2.7			
Lowest daily gain on test	2.3	1.9	1.8			
Steers, No.	None	None	22	11	41	11
Av. wt. 12-17-51			546	462	531	509
Av. wt. 5-19-52			812	739	856	814
Length of feeding period			154	154	154	154
Feed per cwt. gain (lbs.)			1190	1045	940	1001
Concentrates			416	366	329	350
Roughages			774	679	611	651
Av. daily gain on test			1.7	1.8	2.1	2.0
Highest daily gain on test			2.2	2.2	2.6	2.1
Lowest daily gain on test			1.4	1.6	1.4	1.7
Heifers, No.	10	4	78	27	None	None
Av. wt. 12-17-51	534	470	516	439		
Av. wt. 5-19-52	790	660	739	680		
Length of feeding period	154	154	154	154		
Feed per cwt. gain (lbs.)	Fed in pens		1299	1102		
Concentrates	mixed with		455	386		
Roughages	cooperator's calves		844	716		
Av. daily gain on test	1.7	1.2	1.5	1.6		
Highest daily gain on test	1.8	1.4	2.1	1.8		
Lowest daily gain on test	1.3	1.0	.8	1.2		

* See second page following for footnotes on this table.

POSTWEANING PERFORMANCE OF 1951 CALVES FULL FED AFTER WEANING

Calves owned by cooperators, 1951-52 Test

Texas Station
Bluebonnet Farm, McGregor

Line or group designation	Hereford	Brahman	Angus	Shorthorn	Santa Gertrudis
Breeding of calves	Hereford	Brahman	Angus	Shorthorn	Santa Gertrudis
Bulls:					
No.	30	18	4	3	3
Av. wt. 12-17-51	589	489	630	680	842
Av. wt. 5-19-52	922	790	965	1048	1207
Length of feeding period	154	154	154	154	154
Feed per cwt. gain (lbs.)	Fed in pens		1017	1062	1190
Concentrates	with B. F.		356	372	416
Roughages	calves.		661	690	774
Av. daily gain on test	2.2	2.0	2.2	2.4	2.4
Highest daily gain on test	2.9	2.4	2.3	2.6	2.6
Lowest daily gain on test	1.7	1.4	2.0	2.3	2.0
Steers: None					
Heifers:					
No.	9	11	None	None	None
Av. wt. 12-17-51	410	381			
Av. wt. 5-19-52	669	602			
Length of feeding period	154	154			
Feed per cwt. gain (lbs.)	Fed in pens				
Concentrates	with B. F.				
Roughages	calves.				
Av. daily gain on test	1.7	1.4			
Highest daily gain on test	2.1	1.6			
Lowest daily gain on test	1.2	1.1			

Texas Station (continued)

NOTES RE TEST AT BLUEBONNET FARM:

(1) All calves except two lots mentioned below were fed a low concentrate ration. The rations at the earlier and the last part are as follows:

Milo grain	20	23
Cottonseed meal	15	12
Hegari hay	35	35
Johnson grass hay	28	30
Alfalfa leaf meal	2	*
	100	100

(2) The rations for these steers (fed high concentrate ration) at the earlier part and the last part are as follows:

Milo grain	20	56
Cottonseed meal	15	10
Alfalfa leaf meal	2	*
Johnson grass hay	63	29
Ear corn	-	5
	100	100

* The supply of alfalfa leaf meal was exhausted before the end of the test, after which the ration was fortified by the addition of Crystaline Vitamin A acetate. All hay and grain was put through a hammer mill, the complete ration was mixed and was self-fed.

1. Project Title: R-M 650 Improvement of Beef Cattle Within Purebreds and Certain of their Crosses Through Breeding Methods Based on Evaluation Tests for Efficiency and Rate of Gain, Heat Tolerance and Carcass Value.

2. Objectives:

(a) The improvement of beef cattle by selection based on rate and economy of gain, breeding efficiency and carcass value.

(b) To evaluate cattle with regard to environment, especially heat tolerance.

(c) To develop strains of beef cattle especially adapted to Southern climatic conditions by a breeding program using Brahman cattle and one of the European breeds.

(d) To improve the carcass value of cattle of predominantly Brahman breeding by introducing characteristics from one of the European breeds.

3. Accomplishments during year:

(a) 1. Facilities acquired. One large transit mix truck and a series of chain type elevators have more nearly mechanized the processing and feeding of cattle on test. The main working corral had ten additional pens added, which are also very useful for display pens on field days. A heat chamber 30' x 26' has been prepared and is in use.

2. During the year one Brahman bull and three registered Hereford heifers were acquired by purchase. Also five Brahman heifers, thirty Santa Gertrudis cows and two Santa Gertrudis bulls were acquired on long term loan.

(b) 1. This project at Bluebonnet Farm near McGregor, Texas presently includes 391 unregistered and crossbred females, and 78 registered females besides 215 calves and 19 breeding bulls. Of the above, 35 registered Brahman females, 30 unregistered Santa Gertrudis females and 6 breeding bulls are on long time loan to the Experiment Station. Comparisons are being made between registered Brahmans, registered and unregistered Herefords, Santa Gertrudis, and crosses between the Hereford and Brahman breeds. Included are 4 calves of the first back-cross generation with the Hereford as the recurrent breed and 2 with the Brahman as the recurrent breed. Selections are based primarily on rate of gain, breeding efficiency and carcass value. Heat tolerance tests have been started, and it is planned to include in the selection criteria results of these if the present tests confirm the validity of the tests for this purpose. All selection is aimed directly at performance rather than show ring characteristics.

In addition to the above mentioned breeds and crosses, matings have been made for calves from Hereford cows bred to Santa Gertrudis bulls.

All calves raised on the experiment are on test under Project 607. In addition to the calves raised here, we are currently testing 19 steers raised by the Texas Agricultural Experiment Station at Barnhart. These 19 calves were sired by a high, a medium and a low gaining bull from the 1951 test at Balmorhea. As controls, there are 70 bulls and heifers entered by private breeders. These visiting calves are of the Hereford, Brahman, Santa Gertrudis and Charbray breeds.

4. Future Plans:

These call for continuation of the above program with special emphasis on carcass studies of steers, to determine whether these can be used directly as selection criteria of sires, and special emphasis on heat tolerance tests to learn whether they can contribute directly to the selection.

5. Publications:

The results of the 1951-52 testing program were mimeographed and distributed at the Field Day.

6. Publications Planned:

A summary of the evaluation testing at Bluebonnet Farm, both station cattle and cattle belonging to cooperators together with the listing of all bulls by gain and year is now in preparation, and will be offered for publication as a Station bulletin.

PRODUCTION AND/OR SLAUGHTER DATA ON YEARLING AND OLDER CATTLE
NOT INCLUDED IN BREEDING HERDS IN 1952

Calves raised and owned by Texas Station, 1951-52 Test at Bluebonnet Farm

Fed Growing Ration:	Slaughtered at College Station			Slaughtered at Fort Worth	
Line or group designation	Hereford	F_1 (H x B)	F_1 (H x B)	F_1 (H x B)	F_1 (H x B)
Breeding	Hereford	F_1	F_1	F_1	F_1
Sex	Steers	Steers	Bulls	Steers	Bulls
No.	11	14	7	8	7
Av. age at slaughter	437	431	439	418	454
Av. slaughter weight	698	817	915	765	900
Av. slaughter grade	17	16		17	
Av. dressing percent	57.0	60.4	60.2	61.5	59.9
Av. carcass grade	12.7	11.9	14.0	16	17.7
Fed Fattening Ration:					
No.	11	14		26	
Av. age at slaughter	445	439		425	
Av. slaughter weight	751	804		808	
Av. slaughter grade	14	14		15	
Av. dressing percent	61.6	63.3		62.6	
Av. carcass grade	10.0	11.4		16.7	

PERFORMANCE OF COW HERDS 1952 CALVES

Texas Station
Bluebonnet Farm

Line or group designation	Registered Hereford	Registered Brahman	Santa Gertrudis	Unregistered Hereford	F_1 (H x B)	Backcross I (H x F_1)	Backcross II (B x F_1)
Breed of dam	Hereford	Brahman	Santa Gertrudis	Unreg'd Hereford	Unreg'd Hereford	F_1	F_1
Breed of sire	Hereford	Brahman	Santa Gertrudis	Hereford	Brahman	Hereford	Brahman
No. cows bred	24	30	30(1)	69	192	5	9
No. cows calving	17	25	29	55	118	4	2
No. calves raised	16	25	27(2)	50	109	4	2
Av. birth wt.(lbs)	65	57	75	69	76	67	77
Av. birth date ('52)	2-17	2-28	6-22	2-28	3-15	4-10	4-22
Were calves creep fed?	No	No	No	No	No	No	No
Av. wt.at 180 da. (4)	367	364	405(3)	357	385	359	394
Av. wean. date ('52)	10-27	10-27	10-27(3)	10-27	10-27	10-27	10-27
Av. wean. wt.	434	434	400(3)	402	441	371	363
Av. wean. type score	16.0	17.9	17.3 (3)	16.4	18.3	15.8	17.3
**Av. wean. cond. score	4.56	3.88	5.08 (3)	4.32	4.54	4.25	5.0

(1) Range bred at King Ranch. Brought to Bluebonnet Farm, April 9, 1952.
(2) Only 12 of these are old enough to have been weaned.
(3) Only the 12 weaned calves included in average.
(4) Estimated either from weights taken 7-9-52 and 9-9-52 or 9-9-52 and 10-27-52.

** 1 = thin- 4 = medium- 7 = fat- Taken 10-28-52
2 = thin 5 = medium 8 = fat
3 = thin+ 6 = medium+ 9 = fat+

Texas Station (continued)

1. Project Title: R-M 714 Methods of Measuring Potential Efficiency of Feed Utilization in Immature Animals.

2. Objective:

The development of tests that will measure the potential rate of gain and feed efficiency of calves at an immature stage.

3. Accomplishments during year:

(a) Facilities and cattle acquired: During the past year, facilities have been improved so that 22 animals may be fed individually. A set of Fairbanks-Morse scales for weighing large animals has been acquired. The only animals purchased were two dwarf type Herefords. Other animals used were loaned by the Department of Animal Husbandry and six cooperators.

(b) Research Results: The serum protein bound iodine levels have been determined in a total of 60 beef calves, 8-11 months of age, in 3 feeding trials (at College Station, McGregor, and Panhandle, Texas). These levels were compared to subsequent or concomitant feedlot gain. The results indicate that groups of Hereford and Aberdeen Angus calves which show a wide variation in protein bound iodine exhibited a wide variation of gain. In 10 individually fed Hereford bulls (at College Station), a high correlation ($r = 0.84$) was evident between efficiency of gain expressed as pounds of feed required per pound of gain and protein bound iodine level. Under certain conditions a negative correlation between the level of protein bound iodine and feedlot gain was observed. A study of the group of Aberdeen Angus and Hereford bulls (at Pan Tech Farms, Panhandle) indicates that this negative correlation exists only in animals which have an optimal or higher level of protein bound iodine. A low level may be accompanied by lowered rates of gain.

Using seven trained bull calves, it was found that the serum level of protein bound iodine reflects the standard metabolic rate in young beef cattle ($r = 0.91$) and is of value in studying the effects of variation in basal metabolism.

Other studies have been made on the levels of blood glutathione, minerals and hemoglobin. These studies have not as yet revealed any significant relationships to the potential efficiency of feed utilization.

4. Future Plans:

Twenty-two Aberdeen Angus and Hereford calves are being carried on test this year. This group is to be used as a pilot group in which a number of blood constituents will be studied to determine which of these constituents are characteristic of the individual animal.

Texas Station (continued)

With the cooperation of the Pan Tech Farms and Bluebonnet Farm, it is planned to extend the study of the relationship of serum protein-bound iodine levels to rates of gain in about 250 animals.

5. Publications:

Kunkel, H. O., R. W. Colby and C. M. Lyman. A Study of the Protein-Bound Iodine in the Prediction of Rate of Gain in Immature Beef Cattle. Jour. of Ani. Sci., 11: 742, 1952 (Abstract).

6. Publications Planned:

The following manuscripts have been accepted for publication by the Journal indicated:

Kunkel, H. O., R. W. Colby and C. M. Lyman. The Relationship of Serum Protein-Bound Iodine Levels to Rates of Gain in Beef Cattle, Jour. of Ani. Sci. 12(1): 3 - 9, 1953.

Burns, K. H., R. W. Colby, P. Gougler, and H. O. Kunkel. Notes on the Correlation Between Serum Protein-Bound Iodine Levels and Metabolic Rates in Immature Beef Cattle. Am. J. Physiol. (In Press).

POSTWEANING PERFORMANCE OF 1951 CALVES FULL FED AFTER WEANING

Texas Station
College Station

Line or group designation	Hereford I	Hereford II
Breeding of calves	J.N. Williams	Reid Brothers
Bulls, No.	5	5
Length of feeding period	168	168
Feed per cwt. gain (lbs.)		
Concentrates	283	295
Roughage	483	504
Av. daily gain on test	2.40	2.36

VIRGINIA STATION

Submitted by C. M. Kincaid and B. M. Priode, December, 1952.

1. Project Title: The Improvement of Beef Cattle for Virginia Through Breeding Methods.

2. Objectives:

   (a) To study the productivity of stocks of beef cattle now used in Virginia.

   (b) To develop methods for estimating the breeding value with respect to type, growth rate and efficiency of young bulls.

   (c) To establish, maintain and develop herds of beef cattle within the pure breeds that will be highly adapted to the Appalachian region, as measured by their ability to utilize grass and rations with limited concentrates, in the efficient production of animals which yield high quality carcasses of desirable type and conformation.

   (d) To estimate the progress to be expected from mass selection as compared with family selection in the improvement of beef cattle.

   (e) To evaluate selection criteria and procedures and develop more precise and effective measures of quality and performance in beef cattle.

   (f) To simplify the methods of progeny or sib testing whereby breeding cattle can be evaluated at comparatively young ages.

   (a), (b), and (c), above, give the objectives of the initial project outline for Virginia started in 1947 at Blacksburg.

   (d), (e), and (f), above, include the objectives of the Cooperative Project Agreement (A.H. 150.16.1) between the Virginia Agricultural Experiment Station and the Bureau of Animal Industry and the Agricultural Research Administration of the United States Department of Agriculture dated March 1, 1950, for co-operative research at the Beef Cattle Research Station, Front Royal, Virginia.

3. Accomplishments during year:

   (a) Facilities and cattle acquired: A 125 acre tract of bottom land was leased for the production of feed for the Front Royal Station. A 218 acre farm was purchased near Glade Springs in Southwest Virginia for the establishment of the Southwest Virginia Research Farm on which a herd of 25 to 30 breeding cows will be established as a part of its research program. Purchase of 32 purebred cows for the Front Royal Station brings the numbers of breeding cattle to what is believed to be the capacity of that station. As in the past, purebred calves (16 head) were purchased for record of performance tests along with calves raised in the breeding herds.

Virginia Station (continued)

The numbrrs of cows bred at the different stations in the last year were as follows: Blacksburg - 96, Middleburg - 55, and Front Royal - 380. No future increases in breeding cattle numbers are contemplated as these three locations.

(b) Research results:

R. O. P. Testing

Individual record of performance tests were continued at the Blacksburg and Front Royal Stations. Summaries of these tests are shown in the attached tables. Heifers and steers not in the R.O.P. individual feeding tests were tested for performance on winter growing rations and pasture alone in the summer of 1952, with summaries of their performance shown in the attached tables.

An analysis was made of the data from the progeny of the first three sets of fast and slow gaining bulls for the direct measurement of achievement from selection. It appears from these data that the average heritability of growth rate in the feedlot is somewhere in the neighborhood of 25%. Steers full fed on R.O.P gave higher estimates of heritability than their half-sibs which were tested on pasture alone. General agreement of correlations, within sires, between feedlot and pasture performance indicates that progeny tests with either dry lot or pasture feeding can be used to identify sires that transmit ability to make rapid gains.

A study was made of the relation between weight and feed consumption for bulls and steers on individual feeding tests. In these data differences in weight accounted for most of the difference in feed consumption if the animals were self-fed. The study indicated that feed per cwt. gain was not a good measure of efficiency unless the animals on test had the same weight. The correlation between efficiency and rate of gain without correction for differences in weight ranged from zero to 0.6 while the correlation between efficiency and rate of gain after correction for differences in weight ranged from 0.75 to 0.90.

Foundation Herds

Established foundation herds in the Shorthorn breed (see January 1, 1952 report) were continued. Progeny tests of a number of potential Shorthorn foundation sires indicate that one of the tested sires is good enough to retain as a foundation sire.

The production of foundation females from an Eileenmere bull in the Aberdeen Angus breed and a Larry bull in the Hereford breed was continued. It is hoped that a full set (32 head) of females from each bull will be available for breeding by 1954.

Measurement of Performance

The accumulation of data for information on a proper index was continued. The index presently used gives equal emphasis to conformation and weight for age. This index (adopted by the S-10 committee) has been used as the basis for selections in the breeding herds at Front Royal and appears to be satisfactory.

A sale of surplus bulls from R.O.P. test was held at the Front Royal station April 9, 1952. Complete information as to feed consumption and rate of gain was published at the time of the sale on all bulls that had completed the R.O.P. test.

4. Future Plans:

At the Front Royal Station future emphasis will be on the finding of foundation bulls and the development of research herds with replacement of older breeding cows as rapidly as possible. The feeding out of progeny in the selection experiment at Blacksburg will be continued at least through 1953. The cows in the test herd at that Station will be mated to fast and slow gaining bulls as in past years in order to insure progeny in this experiment in 1954 if they are needed. The present work will be continued until the estimate of heritability of growth rate is considered to be reasonably precise. The present herd at Blacksburg will be replaced with breeding cows for a new project possibly on crossbreeding when the present phase of the work is completed. This transition will take place probably in 1954 or 1955.

The Angus herd at Middleburg will be developed through selection for performance from pastures and roughages. It is proposed to use this herd to explore the possibility of developing cattle adapted to a roughage and pasture system.

At the new Southwest Virginia Research Farm a breeding herd will be developed and maintained as a replicate of breeding research at the Blacksburg Station. According to present tentative plans, two unit herds of 15 cows each will be included in the same piece of research as is carried on at the main station.

Plans were laid for the initiation of performance testing work with a group of Aberdeen Angus breeders in the state as a cooperative project between the Virginia Polytechnic Institute and the Virginia Aberdeen Angus Breeders Association. Data to be collected on calves born in 1953 include weights at six and twelve months of age and type ratings at these same ages. Tentative plans indicate that there will be about 750 calves in this program in 1953.

5. Publications:

Kincaid, C. M., R. C. Carter and J. S. Copenhaver. Heritability of Rate of Gain from Progeny Test with Beef Cattle. (Abstract) Jour. Ani. Sci., Vol. 2, No. 4, page 741, 1952.

Kincaid, C. M. and J. E. Grizzle. The Relationship of Size to Feed Consumption for Beef Cattle. Program of Southern Agri. Workers Meeting, New Orleans. February 1953.

6. Publications Planned:

Results will be published as the progress of the work justifies.

POSTWEANING PERFORMANCE OF 1951 CALVES FULL FED AFTER WEANING

Virginia Station
Blacksburg

Line or group designation	Fast 1 (Asp)	Slow 1 (B)	Fast 2 (Ad)	Slow 2 (H)	Fast 3 (OB)	Slow 3 (p)	Fast 4 (Ty)	Slow 4 (R)	Fast 5 (641)	Slow 5 (639)
Breeding of calves	A x H	A x H	A x H	A x H	Heref.	Heref.	Heref.	Heref.	Sh x H	Sh x H
Steers										
No.	4	4	3	3	4	4	4	4	4	2
Av. weaning wt.	470	455	500	478	410	487	372	411	385	416
Av. 12 mo. wt.	737	729	780	758	737	742	600	686	694	701
Length of feeding period	204	204	204	204	204	204	204	204	204	204
Feed per cwt. gain (lbs)*										
Concentrates	1069	1091	1016	908	867	1033	905	850	960	931
Roughage										
Av. da. gain on test	1.84	1.81	1.90	2.06	1.91	1.76	1.60	1.88	1.81	2.00
Av. slaughter grade **	13.0	13.8	12.7	12.7	12.8	12.6	12.8	13.0	13.2	14.5
Av. carcass grade	13.2	13.3	12.3	12.7	12.8	12.8	12.0	12.0	13.2	13.5

* The ratio of concentrates to hay was 60:40 in the first half of feeding period and 75:25 in the last half with all components ground, mixed and self-fed.

** 6-8 Medium; 9-11 Good; 12-14 Choice.

POSTWEANING PERFORMANCE OF 1951 CALVES FULL FED AFTER WEANING

Virginia Station

Line or group designation	R.O.P.	R.O.P.	R.O.P.	R.O.P.
Location	Front Royal	Front Royal	Front Royal	Front Royal
Breeding of calves	All animals fed	Angus	Hereford	Shorthorn
Bulls				
No.	41	15	12	14
Av. weaning wt.	475	503	446	469
Av. 12 mo. wt.	774	782	785	755
Length of feeding period (1)	168	168	168	168
Feed per cwt. gain (lbs.) Mixed ration	885	935	829	892
Av. daily gain on test	2.09	2.03	2.07	2.16
Av. type score (end of trial)	10.33	10.35	9.83	10.73
Heifers				
No.	45	15	15	15
Av. initial wt. (2)	376	348	397	444
Av. 12 mo. wt.	523	488	524	557
Length of feeding period	97	97	97	97
Feed per cwt. gain (lbs.) Mixed ration	984	891	998	1057
Av. daily gain on test	1.64	1.53	1.79	1.61
Av. type score (12 mo.)	-	11.00	12.00	11.40

(1) Hay and grain ground and mixed together at ratio of 40:60.
(2) Weight when put on feed 75 days after weaning. They were carried on pasture from Oct. 15, 1951 to Jan. 1, 1952.

PRODUCTION AND/OR SLAUGHTER DATA ON YEARLING AND OLDER CATTLE
NOT INCLUDED IN BREEDING HERDS IN 1952

	Virginia Station									
Line or group designation	Fast 1 (Asp)	Slow 2 (Blan)	Fast 2 (Ad)	Slow 2 (Holtz)	Fast 3 (O.B.)	Slow 3 (P)	Fast 4 (Tys)	Slow 4 (Read)	Fast 5 (641)	Slow 5 (639)
Breeding	A x H	A x H	A x H	A x H	H	H	H	H	Sh x H	Sh x H
Sex	Heifer	Heifer	Heifer	Heifer	Heifer	Heifer	Heifer	Heifer	Heifer	Heifer
No.	2	2	6	5	5	5	5	2	3	7
Av. age (fall 1951)	194	210	234	209	219	220	231	212	219	203
Av. wt. (fall 1951)	366	299	455	418	428	419	406	400	400	365
Av. winter gain *	105	108	80	115	86	76	88	62	105	125
Days on pasture	168	168	168	168	168	168	168	168	168	168
Av. gain on pasture	213	213	250	231	199	226	222	272	225	228
Av. wt. adjusted to 18 mo. of age	718	620	733	730	686	676	647	692	664	678
Animals slau. (No.)	1	0	3	2	2	2	3	0	1	5
Av. age at slaughter	559		588	554	580	554	511		594	548
Av. slaughter wt.	609		821	764	720	710	720		738	694
Av. slaughter grade	5.7		8.3	7.2	7.3	6.9	9.7		7.1	8.3
Av. dressing percent	51.6		54.1	51.6	50.9	54.3	52.0		56.0	51.2
Av. carcass grade	7.0		8.0	8.0	6.5	7.0	8.3		7.0	7.0

* Winter ration was 4# hay, 8# silage, and 3# concentrates per day. Summer ration was pasture alone.

PRODUCTION AND/OR SLAUGHTER DATA ON YEARLING AND OLDER CATTLE
NOT INCLUDED IN BREEDING HERDS IN 1952.

Virginia Station
Front Royal

Line or group designation	R.O.P.	Not on R.O.P.	R.O.P.	Not on R.O.P.	R.O.P.
Breeding:	S'horn	S'horn	Heref.	Heref.	Angus
Sex	Female	Female	Female	Female	Female
No.	15	4	15	10	15
Av. age (fall 1951)	211	188	206	167	217
Av. wt. (fall 1951)	393	326	330	282	406
Av. winter gain	176.5	119.5	166.3	141.6	193.5
Days on pasture (summer 1952)	176	176	176	176	176
Av. gain on pasture	99.5	111.0	173.6	137.5	101.2

PERFORMANCE OF COW HERDS. 1952 CALVES

	Virginia Station							
Line or group designation	Fast An.	Fast O.E.	Slow Ad.	Slow F.R.	Fast V.	Slow F.R.	Eileenmere	Epponian
Location	(- - -	- - - -	Blacksburg Station -		- - - -	- -)	(Middleburg)	
Breed of sire	Angus	Angus	Angus	Angus	Hereford	Hereford	Angus	Angus
Breed of dam	Gr. Here.	Gr. Here.	Gr. Here.	Gr. Here.	Gr. Here.	Gr. Here.	Angus	Angus
No. cows bred	15	16	15	17	16	16	28	28
No. cows calving	14	15	14	15	14	12	25	26
No. calves raised	14	15	14	14	12	11	21	24
Av. birth wt. (lbs.)	75	74	75	70	79	69	-	-
Av. birth date	3/9/52	3/5/52	3/14/52	3/7/52	3/17/52	3/7/52	9/18/51	9/13/51
Were calves creep fed?	No	No	No	No	No	No	No	No
Av. wt. 6 mo. (lbs.)	404	367	360	375	358	312	314	272
Av. weaning date	10/5/52	10/5/52	10/5/52	10/5/52	10/5/52	10/5/52	4/1/52	4/1/52
Av. weaning wt.	478	447	436	455	415	388	395	372
Av. wean. type score	12.2	11.7	12.2	12.1	11.9	12.3	-	-

PERFORMANCE OF COW HERDS. 1952 CALVES

Virginia Station
Front Royal

Line or group designation	1	2	3	4	5	6	7
Sire no.	Sni-A-Bar 522	B.L.R. 663	Type 794	Growth 116	Test 03	Test 021	Test 44
Breed of sire	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn
Breed of dam	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn
No. cows bred	16	15	13	15	19	16	17
No. cows calving	11	11	10	14	17	14	16
No. calves raised	9	11	9	14	14	14	10
Av. inbr. of dams (%)	8.0	9.4	10.8	9.7	5.5	9.1	8.1
Av. inbr. of calves (%) /1	-	-	-	-	-	-	-
Av. birth wt. (lbs.)	77	69	75	73	65	68	63
Av. birth date	3/9/52	3/30/52	3/21/52	3/12/52	3/25/52	3/28/52	3/24/52
Were calves creep fed?	No	No	No	No	No	No	No
Av. wt. 6 mo. (lbs.)	364	394	342	387	366	351	304
Av. weaning date	10/10/52	10/10/52	10/10/52	10/10/52	10/10/52	10/10/52	10/10/52
Av. weaning wt.	426	424	371	438	397	383	375
Av. wean. type score	10.0	11.7	10.2	11.6	10.3	9.7	10.5
Av. wean. cond. score	9.3	10.6	9.7	10.8	10.3	9.3	10.0

/1 Has not been calculated.

PERFORMANCE OF COW HERDS. 1952 CALVES

Virginia Station
Front Royal

Line or group designation	8	9	10	11 & 16	12	13	14	15
Sire no.	Test 30	Test 59	Test 19	Test 31	Test 73	Test 71	Test 74	Test 72
Breed of sire	Angus	Angus	Angus	Hereford	Hereford	Hereford	Hereford	Hereford
Breed of dam	Angus	Angus	Angus	Hereford	Heref./1	Heref./1	Hereford	Hereford
No. cows bred	10	34	22	62	17	18	20	16
No. cows calving	9	23	20	47	14	11	12	13
No. calves raised	9	22	20	43	12	10	9	13
Av. birth wt. (lbs)	61	64	62	64	66	76	61	66
Av. birth date	2/26/52	3/1/52	2/22/52	4/3/52	3/25/52	3/14/52	3/23/52	4/1/52
Were calves creep fed?	No	No	No	No	No	No	No	No
Av. wt. 6 mo. (lbs.)	402	415	434	338	376	413	351	374
Av. weaning date	10/10/52	10/10/52	10/10/52	10/10/52	10/10/52	10/10/52	10/10/52	10/10/52
Av. weaning wt.	468	488	514	351	384	459	377	390
Av. weaning type score	11.7	11.6	11.4	11.4	10.4	10.2	10.0	11.2
Av. wean. cond. score	11.1	11.0	11.2	10.6	10.3	11.0	10.2	10.9

/1 Includes both grade and purebred cows and their calves

S-10, IMPROVEMENT OF BEEF CATTLE FOR THE SOUTHERN REGION THROUGH BREEDING METHODS

Report of

Annual Meeting S-10 Technical Committee

Held at Baton Rouge, Louisiana

October 11-13, 1954

State Experiment Stations of Alabama, Arkansas, Georgia, Florida, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Texas and Virginia in cooperation with the Animal and Poultry Husbandry Research Branch, Agricultural Research Service, U. S. Department of Agriculture. This report is intended for the use of administrative leaders and workers in developing the program and is not for general distribution.

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1954 S-10 Technical Committee Meeting

The 1954 S-10 Technical Committee Meeting was held in Louisiana October 11-13. Most of the 11th was devoted to an optional trip to the Iberia Livestock Experiment Station, Jeanerette, Louisiana, where experimental animals were inspected. Station personnel described and discussed the work in progress.

The group met in an informal session the evening of October 11 in Baton Rouge with various members of the Committee showing slides illustrating their work.

The formal meeting of the group was called to order by Chairman C S. Hobbs at 8:30 a.m., October 12. The meeting began with each person present introducing himself. Special mention was made of the attendance of Dr. Alex J. Bean of the Ministry of Agriculture, Scotland, and Dr. D. J. Annet, a veterinarian working with the French Government in French Equatorial Africa.

The following Technical Committee members and guests were present:

Keith Gregory	Ala. Agr. Exp. Sta., Auburn, Alabama
George B. Meadows	Ala. Agr. Exp. Sta., Auburn, Alabama
C. J. Brown	Ark. Agr. Exp. Sta., Fayetteville, Arkansas
Warren Gifford	Ark. Agr. Exp. Sta., Fayetteville, Arkansas
M. W. Muldrow	Ark. Agr. Ext. Sta., Little Rock, Arkansas
Maurice L. Ray	Ark. Agr. Exp. Sta., Fayetteville, Arkansas
Ralph W. Kidder	Fla. Agr. Exp. Sta., Belle Glade, Florida
Marvin Koger	Fla. Agr. Exp. Sta., Gainesville, Florida
Alvin C. Warnick	Fla. Agr. Exp. Sta., Gainesville, Florida
T. M. Clyburn	Ga. Agr. Exp. Sta., Reidsville, Georgia
W. C. McCormick	Ga. Agr. Exp. Sta., Tifton, Georgia
B. L. Southwell	Ga. Agr. Exp. Sta., Tifton, Georgia
Dewey G. Steele	Ky. Agr. Exp. Sta., Lexington, Kentucky
R. A. Damon, Jr.	La. Agr. Exp. Sta., Baton Rouge, Louisiana
James E. Johnston	La. Agr. Exp. Sta., Baton Rouge, Louisiana
J. E. Foster	Md. Agr. Exp. Sta., College Park, Maryland
Ralph Boulware	Miss. Agr. Exp. Sta., Starkville, Mississippi
James R. Darnell	Miss. Agr. Exp. Sta., Starkville, Mississippi
C. E. Lindley	Miss. Agr. Exp. Sta., Starkville, Mississippi
L. C. Ulberg	Miss. Agr. Exp. Sta., Starkville, Mississippi
H. A. Stewart	N. C. Agr. Exp. Sta., Raleigh, North Carolina
E. G. Godbey	S. C. Agr. Exp. Sta., Clemson, South Carolina
W. C. Godley	S. C. Agr. Exp. Sta., Clemson, South Carolina
Chas. S. Hobbs	Tenn. Agr. Exp. Sta., Knoxville, Tennessee
H. J. Smith	Tenn. Agr. Exp. Sta., Knoxville, Tennessee
R. E. Patterson	Tex. Agr. Exp. Sta., College Station, Texas
Thos. C. Cartwright	Tex. Agr. Exp. Sta., McGregor, Texas
Bruce L. Warwick	Tex. Agr. Exp. Sta., McGregor, Texas
R. C. Carter	Va. Agr. Exp. Sta., Blacksburg, Virginia
C. M. Kincaid	Va. Agr. Exp. Sta. Blacksburg, Virginia
Martin Burris	Va. Agr. Exp. Sta., Front Royal, Virginia

M. W. Hazen	USDA, Brooksville, Florida
E. H. Vernon	USDA, Jeanerette, Louisiana
Louis L. Madsen	USDA, Beltsville, Maryland
E. J. Warwick	USDA, Knoxville, Tennessee
B. M. Priode	USDA, Front Royal, Virginia
James O. Grandstaff	Office of Exp. Stations, Washington, D. C.
Alex J. Bean	Ministry of Agriculture, Scotland
D. J. Annet	French Equatorial Africa

Three administrative officials of Louisiana State University, namely, Dean J. G. Lee of the School of Agriculture, Director J. N. Efferson of the Agricultural Experiment Station, and Prof. J. B. Francioni, Head of the Animal Industry Department, were present and extended a cordial welcome to the group. All these men stressed the growing importance of livestock and particularly cattle to the agricultural economy of Louisiana and the South in general.

Dr. R. E. Patterson, Administrative Advisor of the S-10 Project responded on behalf of the Committee and reviewed briefly the history of the S-10 Project.

Dr. Hobbs appointed H. A. Stewart, Keith E. Gregory and E. G. Godbey as members of a Resolutions Committee and requested that they have their report ready at the time of the business meeting on Wednesday. He also announced a meeting of the Executive Committee for Tuesday evening.

Dr. Hobbs then turned the meeting over to E. J. Warwick with the request that he preside during the presentation of the state reports which would make up a large portion of the 1954 meeting.

Dr. Warwick indicated that the Executive Committee in designing the program to include reports from approximately half the stations did so with the hope that the reports would deal primarily with the presentation of results already obtained and plans for future work and that they would be prepared in such a manner as to stimulate discussion and suggestions. Helpful discussions followed several of the presentations.

The following material represents summaries of the material prepared by various state project personnel.

Arkansas Station Report

by: C. J. Brown

Records of the performance of the beef cattle in the Arkansas project have been continued in the same manner that has been outlined before this group at previous meetings. Four hundred and three (403) cattle of all breeds have been classified for type. Weights and measurements have been taken at regular intervals on 136 Hereford, 298 Aberdeen-Angus and 29 Shorthorn cattle during the past year. The method of taking these measurements was demonstrated at last year's meeting. Growth curves are being calculated from these measurements data. These data have been recorded on IBM cards which should facilitate further analysis.

Due to the severe drouth the past year, it was not possible to continue with the studies of milk production as had been planned. It is hoped to resume those studies in the spring.

Twenty bulls (6 Hereford, 13 Aberdeen-Angus, 1 Shorthorn) have completed the 154 day feed lot performance test during the past year. The fastest gaining Hereford bull was retained for service in Station herds. Other bulls with satisfactory performance were sold at public auction. On this limited number of bulls, there was a $31.00 price increase per unit increase in index score which gave equal weight to type score, average of daily gain, and feed efficiency. At present, 29 other bulls are nearing completion of the test. Preparations have been made to initiate a co-operative testing program for breeders in Arkansas this fall.

Since there were some questions at last year's meeting concerning calculation of reproductive performance at the Arkansas Station, the following figures on a herd of Hereford cows may be of interest.

This Hereford herd was established in 1940 with 29 females acquired for a foundation. (Six cows and 23 weaned heifer calves). Since that time the only female additions were made in 1951 and 1952 when seven (7) bred heifers and two (2) cows were added. All eight (8) bulls used except one bull, which was used in 1953, have been purchased. Care and management have been adequate and comparable to that of the more progressive farmers in the area. Hand mating has been practiced and calves were dropped from September through May. Of this original 29 foundation animals, 25 produced calves, however, of these only 7 are found in pedigrees of present calf crops. With the exception of the 1951-52 additions, the relationship among the animals in the herd at present is approximately 30%. At present, there are 72 females old enough to calve or older, and 29 females too young to calve.

338 calves were dropped in the herd.
165 males - 48.8%
173 females - 51.2%
116 females had an opportunity to calve
98 females calved at least once - 84.5%
71 females calved at least twice - 61.2%

The average age at 1st calving was 30.5 months, standard deviation of 2.8 mo.

The average calving interval was 406 days, standard deviation of 79 days.

From 236 intervals of 71 cows, the repeatability calculated as intra-class correlation was .041.

Among cows which were dropped in the herd, the following correlations were observed:

	1st. Interval	2nd. Interval	Ave. all other Intervals
Degrees of Freedom	46	30	23
Age 1st calf	.047	-.432	.058
1st. Interval		-.022	.114
2nd. Interval			.095

The average gestation length in this herd was 283.8 days.

Male calves were carried 1.99 days longer than females.

Significant differences due to sire and age of dam were observed on gestation length.

A correlation of .33 was observed between birth weight and gestation length of 129 calves.

Alabama Report

Keith E. Gregory gave the Alabama report and reviewed briefly the progress made at the station. Approximately 975 acres of land were purchased by the Alabama Agricultural Experiment Station early in 1950 for the purpose of developing a beef cattle breeding research unit. Most of this area was abandoned crop land that had been idle for several years. The entire area has been fenced and approximately 300 acres has been reclaimed and seeded to grazing crops. The remainder of the land will be reclaimed and brought into production as rapidly as possible.

The major portion of Dr. Gregory's report was devoted to a discussion of a proposed crossbreeding study. An outline of this proposed study follows:

PROPOSED EXPERIMENTAL DESIGN FOR CROSSBREEDING EXPERIMENT WITH BEEF CATTLE TO BEGIN IN 1955 - ALABAMA

I. Numbers:

30 Angus
30 Hereford
30 Shorthorn

II. How they will be bred:

Number	Bull		Cows
10	Angus	X	Angus
10	Hereford	X	Angus
10	Shorthorn	X	Angus
30 Angus Cows			
10	Hereford	X	Hereford
10	Angus	X	Hereford
10	Shorthorn	X	Hereford
30 Hereford Cows			
10	Shorthorn	X	Shorthorn
10	Angus	X	Shorthorn
10	Hereford	X	Shorthorn
30 Shorthorn Cows.			

Use one bull of each breed if possible in each season. Each Hereford, Angus and Shorthorn bull would bred 10 Hereford, 10 Angus and 10 Shorthorn cows in each season -- same bull would sire crossbred and purebred calves in each season.

III. Tentative plan is to run for three years, rotating cow groups each year. Should bulls be changed annually?

BASIC COMPARISONS

	One Season	Three Seasons
Angus - Hereford	20	60
Angus X Hereford	20	60
Angus - Shorthorn	20	60
Angus X Shorthorn	20	60
Shorthorn - Hereford	20	60
Shorthorn X Hereford	20	60
Mean Purebreds	30	90
Mean Crosses	60	180

IV. Effect of Heterosis on Mothering Ability:

Possible Plans

Plan I

Bulls		Cows
Shorthorn	X	(Angus X Hereford)
Angus	X	(Shorthorn X Hereford)
Hereford	X	(Angus X Shorthorn)
(Angus X Hereford)	X	Shorthorn
(Shorthorn X Hereford)	X	Angus
(Angus X Shorthorn)	X	Hereford

1. Can compare means of calves out of purebred cows with means of calves out of crossbred cows(does not consider sire effects).

2. Cannot make group comparisons

Plan II

Bulls		Cows
Hereford	X	Shorthorn (1/2)
Angus	X	Shorthorn (1/2)
Shorthorn	X	(Angus X Hereford)
Shorthorn	X	Angus (1/2)
Hereford	X	Angus (1/2)
Angus	X	Shorthorn X Hereford)
Shorthorn	X	Hereford (1/2)
Angus	X	Hereford (1/2)
Hereford	X	Angus X Shorthorn)

The same bull of each breed will be used across the board in each season.

BASIC COMPARISONS

Shorthorn X (Angus X Hereford)
(Shorthorn X Angus)
(Shorthorn X Hereford)

Angus X (Shorthorn X Hereford)
(Angus X Shorthorn)
(Angus X Hereford)

Hereford X (Angus X Shorthorn)
(Hereford X Shorthorn)
(Hereford X Angus)

Disadvantage: Genotype of individual calves not comparable.

In addition to a good deal of discussion on the outline of the proposed crossbreeding project, the question of whether or not breeds should be identified in station releases containing performance information came up for discussion. In spite of the fact that these can be sometimes misused by partisans of the various breeds, several people in the group expressed themselves as believing that such releases should be made. It was furthermore pointed out by someone in the group that a publication showing inferior performance in one or more items might be a good thing for the breed concerned since it would bring the trouble into focus.

Florida Station Report

by: Marvin Koger and Alvin C. Warnick

At present, there are four active breeding projects included in S-10. Two additional projects are being prepared for submission to the Committee. Studies on physiology of reproduction are being made under existing S-10 project outlines and two projects devoted exclusively to reproduction. While the reproduction projects have not been included in S-10 they are considered an integral part of our breeding program in Florida.

These projects are being conducted at four different locations in the state.

General Objectives

The objective has been to initiate work at the various locations which will have application to problems peculiar to the locality where such problems exist, to avoid undue duplication of effort and to work on as many of the questions that need answering as facilities and resources will permit. The topics that are under investigation or soon will be, include:

1. Adaptability of various breeds and strains of cattle for beef production under Florida conditions.
2. Interaction of breed performance with nutrition level.
3. Breeding systems for commercial beef production.
4. Heritability of various traits in heterogeneous populations.
5. Carcass desirability in cattle of various breeds, strains and combinations.
6. The causes of low reproduction in Florida.
7. The genetic relationship between various types of dwarfism appearing in cattle.

Projects

Following are the projects under way and that are being planned. The number, objectives and location are listed with the title being omitted for the sake of brevity:

Active S-10 Projects

1. No. 390. Object: To determine the value of different crosses and strains of cattle for foundation animals and commercial beef production. Location: Range Cattle Station, Ona.

2. No. 615. Object: To determine the relative productivity of cows with different proportions of English and Brahman blood when run under pasture programs designed to supply low, medium and good nutrition levels. Location: Range Cattle Station, Ona.

3. No. 627. Object: To evaluate the influence of pasture programs and breeding plans on beef production with a cow-calf operation. Location: Beef Research Unit, Gainesville.

4. No. 629. Object: To test the performance of different breeds and crosses in different breed systems and to determine if the combining ability of breeds used for cross breeding can be improved by cross progeny testing. Location: Brooksville. (Cooperative with U.S.D.A.)

Projects in Process for Inclusion in S-10

1. (Revision of project No. 545.) Object: To compare the performance of purebred Brahman and Devon cattle with their crossbred progeny, along with animals selected from a crossbred foundation, and to explore the development of a strain of Angus cattle adapted to South Florida conditions by selection among southern grown animals Location: Everglades Station, Belle Glade.

2. Object: To characterize and determine the genetic relationship between the various types of dwarfism prevalent in the different breeds of beef cattle. Location: Gainesville.

Possible Projects in the Planning Stage

1. Object: To determine the response from crossbreeding and rotational crossbreeding of English breeds.

2. Object: To investigate phenotypic characteristics associated with good productive performance under Florida climatic conditions.

3. Object: To determine by means of a selection experiment the relation of size to performance under southeastern climatic conditions.

Projects Not Listed as S-10 But that are Considered an Integral Part of Breeding Research.

1. No. 631. Object: To compare the carcass characteristics of purebred Brahmans, purebred British breeds and their crosses. Location: Gainesville.

2. No. 709. Object: To determine factors associated with and methods of improving the efficiency of reproduction with beef cattle. Location: Gainesville, Range Cattle Station and Brooksville.

3. (In Process). Object: A comparison of productive performance in Angus, Brahman and Hereford cattle in central Florida. Location: Purebred Unit, Gainesville.

4. (In Process). Object: To study the reproductive behavior of Angus, Brahman and Hereford cattle. Location: Purebred Unit, Gainesville.

Significant Results to Date

With the exception of projects No. 390 and No. 545, all of the breeding projects in Florida have been in effect for less than three years. Consequently, results to date are limited. Results published include the following:

1. Kidder, R. W., and H. L Chapman, Jr. A preliminary report of weight performances of crossbred and purebred cattle at the Everglades Experiment Station from 1943 to 1951. Mimeograph Report at Southern Agricultural Workers' Conference. 1952.

2. Peacock, F. M. Factors affecting the weaning weight of range calves. M. S. Thesis. U. of Fla. 1953.

3. Peacock, F. M., W. G. Kirk and M. Koger. Effect of breeding of dam on weaning weight of range calves. Jour. Ani. Sci. 12:896. 1953. (abs.)

4. Pearson, A.M., M. Koger , W. G. Kirk, D. H. Kropf, R. B. Sloth and J. F. Hentges, Jr. A comparison of certain carcass characteristics of Brahman versus British breeds of steers. Jour. Ani. Sci. 12:897. 1953. (abs.).

5. Kirk, W. G. and F. M. Peacock. Productivity of Brahman bulls. Report at Southern Agricultural Workers' Conference. 1954.

6. Burns, W. C. Factors associated with low fertility in beef cows. M. S. Thesis. U. of Fla. 1954.

The results reported by Kidder and Chapman indicate probably the greatest exhibition of hybrid vigor that has been observed in crossbreeding of cattle. The parent breeds were Brahman and Devon. Data from the Range Cattle Station (Peacock et al.), where the English Breed has been predominately Shorthorn, showed that the peak weaning weight of calves was observed in F_1 cows with production falling off progressively with increase in either Brahman or English Blood. While statistically significant, the magnitude of the difference in production of cows of different breeds was not impressive and appeared to parallel mature body weight of cows. Cows of predominately one breeding were mated to bulls of the opposite breed, however, and the results may have been confounded by hybrid vigor in the calves of these groups being greater than in calves from the crossbred cows.

Results from the Beef Research Unit to date tend to support the opinion prevalent among ranchers that straight breeding of animals of Brahman or predominately Brahman breeding is not to be recommended for improved pasture conditions. Data is not extensive enough to draw conclusions on the relative combining ability of Angus, Hereford and Shorthorn bulls with grade Brahman cows, although to date, Angus calves have been slightly superior when both weight and grade are considered.

Initial studies on reproduction suggest a breed difference (Brahman vs. English breeds) in causes of low fertility and reproductive failure.

Experience in assembling herds of dwarfs and dwarf carrier animals would indicate that the phenotypic variation in dwarfs is greater than has been realized. Including breed differences, there appear to be 6 or 7 more or less characteristic syndromes encountered rather frequently. It is suggested that many of the animals lighly dismissed as "runts", "knot-heads", etc. may be genetic dwarfs. Dwarfs have been encountered in the four major breeds found in the state - including occasional crossbred dwarfs. How many of these are caused by non-hereditary physiological and nutritional factors; how many are genetic in nature remains to be determined.

Some Problems Encountered

In starting work on reproduction, it appears that we many have "caught the proverbial lion by the tail". That low reproduction is the most serious problem facing the cattle industry of the southern two-thirds of the state, no one any longer doubts. Unraveling the genetic, nutritional, climatic and management factors responsible offers no dearth of problems to work on.

A very practical problem to contend with is that of providing nutrition on a year-round basis that is adequate to achieve a satisfactory level of production without prohibitive costs. Grasses on many soils are almost unbelievably low in protein, and possibly other factors essential for reproduction particularly (for example: for two years in succession at the Beef Research Unit the conception rate in nursing cows on all grass pastures

has been 0 as compared to 63 percent for similar cows on pastures containing legumes, clovers and lespedeza). While our grazing season is longer than in many areas, periods of starvation may be encountered in the winter and spring months unless forage is stored.

An interesting problem has been encountered as a result of cow psyschology. In comparing performance of cattle of different breeding groups, it was thought that the best way to insure uniform treatment of groups would be to run them in the same pasture together. In practice, however, we find that the cattle sort themselves remarkably well by breeds where the more aggressive groups presumably might graze the better areas while the more timid groups would be relegated to areas where feed was less desirable! Should the cattle be lotted by breeds and rotated through pastures or the different breeds run together?

Georgia Station Report

by W. C. McCormick and B. L. Southwell

An eighteen-year genetic study of the Polled Hereford was presented. Data were collected uniformly enough throughout the years to permit an analysis of birth weights, weaning weights, rate of gain in feed lot and year-old weights.

Birth weights: A total of 532 birth weights were available for study. These weights were from nineteen bulls and out of 139 cows. The weights ranged from forty to one hundred pounds. The mean weight for males was 4.45 pounds heavier than the mean weight for the females. All calves were corrected to a male basis by adding 4.45 pounds to the females. Calves born to two, three, and four year old cows averaged ten, six and two pounds less than those from older cows; therefore, these respective age-of-dam corrections were made. The final sex-and-age-of-dam-adjusted mean birth weight was 78.71 pounds, the standard deviation was 9.28 pounds and the standard error was .40 pound.

The repeatability of sex-adjusted birth weight for all the cows calving was 24 percent and for cows having two or more records, was twenty percent.

Repeatability of sire performance was calculated from yearly mean birth weights of the various sires. Seasonal corrections were also made in this case. Thirty-six bull seasons were involved in the analysis and the average number of yearly progeny groups per sire was 1.89. The calculated estimate of repeatability was 77 percent.

Heritability estimates of birth weight adjusted for sex-and-age-of-dam differences were 28 percent as determined by quadrupling the phenotypic correlation between paternal half sibs and 25 percent by doubling the intra-sire regression of offspring on dam.

The principal factors causing variations in birth weights in this herd were sex, age of dam, season, sire and dam. It was interesting to note that birth weights tended to decrease with the years even though plane of nutrition for the cows was considered as improving. Season, sire, and cow differences were responsible for the downward trend. These differences were confounded and their relative influence could not be evaluated.

Weaning weights: Since 98-day weights were recorded during the nursing period it was possible to adjust all calves to a standard weaning age of 210 days. A total of 491 weaning weights were studied. The calves were sired by nineteen bulls and out of 124 cows.

The 210 day mean weaning weight was 430 pounds. The bull calves averaged 38 pounds heavier than the heifers; therefore, to adjust for this variable the heifers were corrected to a bull basis. The 210-days weights were studied by age-of-dam classes. The weaning weights increased with age of dams up to eight years, were relatively similar from eight through eleven year old cows, and decreased from twelve through fifteen year old cows. This same trend was evident when records of cows remaining in the herd through the eight year old class were studied; this indicated that culling had not necessarily caused the trend. The sex adjusted weights were then corrected to an eight-year-old dam basis by adding 107, 68, 42, 22, 17, 10, 31, 41, 77, and 57 pounds to calves from 2, 3, 4, 5, 6, 7, 12, 13, 14, and 15 year old cows, respectively. The numbers in the twelve to fifteen year old classes were small; however, the downward trend in weights was judged real because many of these old cows' incisor teeth were badly worn.

The 210-day sex-and-age-of-dam adjusted mean weaning weight was 478 pounds. The standard deviation was 62 pounds while the standard error was 2.80 pounds. The 210-day unadjusted weights ranged from 200 to 620 pounds.

A repeatability estimate of 51 percent was calculated for the sex-adjusted weights from differences between cows within seasons and age-of-dam groups. The repeatability of sire performance determined from yearly average weaning weights for sire groups was 49 percent. Seasonal corrections were also made in this case.

Heritability estimates were determined from paternal half-sib correlations for the 210-day, 210 day-sex adjusted, and for the 210-day sex-and-age-of-dam adjusted weights. These values were 37, 43, and three percent respectively. The age-of-dam corrections apparently removed sire differences resulting in a low value for this portion of the data.

Sex, age-of-dam, sire, dam, and season were again the variables affecting weaning weight. These differences were highly significant in all cases except where age-of-dam corrections apparently removed sire differences. Weaning weights trended downward with years just as did birth weights. Here again, it was impossible to evaluate the relative importance of season, sire and cow differences because all were confounded.

Rate of Gain: Only nine years data were considered usable for rate of gain studies. Such variations as restrictions of diet, sickness, length of elimination of the other portion of the data.

Records of 246 calves sired by eleven bulls during nine seasons were studied. The bull calves ranged in gain from 143 to 465 pounds while the heifers ranged from 145 to 373 pounds. The feedin: period was 140 days. The bull calves gained approximately 70 pounds more than the heifers; therefore, the heifer calves were corrected to a bull basis by the addition of this amount to their gain.

The repeatability of sire performance calculated from the mean feed lot gain for yearly sire progeny groups (seasonal corrections made) was 45 percent. Heritability was estimated at 29 percent from half-sib correlations.

Seasonal and sex variations were highly significant. Sire differences were significant when controlled statistically but the addition of another year's data and all data seasonally corrected removed this difference. Rate of gain held its own and may have increased sli htly during the period of this study.

Yearling Weights: The 210-day-sex-and-age-of-dam adjusted weaning weights were added to the 140-day-sex-adjusted feed lot gain to obtain a 350 day or yearling weight. This procedure was deemed advisable because sex, age-of-dam and seasonal variations continued to exist at a year of age.

Two hundred and forty-five yearling weights were studied. The mean 350-day weight was 814 pounds with a standard deviation of 78 pounds and a standard error of 5.20 pounds. The range in weights was 563 to 1005 pounds.

The repeatability of cow performance for yearling weight of off-spring was 44 percent. The repeatability of sire performance was 37 percent. The heritability of yearling weight was sixteen percent. Seasonal differences in yearling weights were highly significant; however, sire differences were not significant.

A complete pedigree diagram and chart of genetic covariances indicated that inbreeding in the herd was negligible due primarily to purchase of unrelated sires.

Crossbreeding Studies: A group of grade Hereford cows were divided comparably and mated to Brahman and Angus bulls for a period of three years. A study of the birth and 210 day weights indicated that the Brahman cross calves were significantly heavier than the Angus cross calves. The steer calves were slaughtered. The Brahman cross calves were significantly higher in dressing percent. The Angus cross calves graded slightly higher as slaughter calves and in carcass; however, the returns per calf were somewhat greater for the Brahman cross calves due to the extra weight at weaning and the higher yield. The heifers from both crosses were fed for a 140 day period. The Angus cross heifers gained significantly faster than the Brahman cross

heifers. Feed efficiency was similar for both groups.

The above heifers were removed from feed lot and have been bred to a common sire during three seasons. Approximately 20 offspring have been weaned from each group. The Brahman cross heifers have weaned calves weighing approximately 75 pounds heavier at 210 days of age than the Angus cross heifer's calves.

Louisiana Station Report

by: R. A. Damon, Jr.

The latter part of the afternoon of October 12 was reserved for a tour of the Louisiana State University Farm for the purpose of observing experimental animals used in beef cattle breeding research. Prior to leaving for the farm, R. A. Damon, Jr. briefly discussed the plan of their experiment. Briefly, it includes 48 cows of each of four breeds. Each year cows of each breed are divided into six comparable groups of eight cows each. Bulls of six breeds are used with each bull being bred to eight cows of each breed. After the initial phases of the project are completed heifers produced in the early years will be compared in backcrosses and three-way crosses.

Unfortunately, a torrential rain storm seriously interfered with the trip to the farm.

Some summaries on the performance of 1953 calves follows:

Table 2. Weaning Weight Data by Breeds of Cows

	Angus	Brangus	Brahman	Hereford	Total
No. Calves	26	34	25	29	114
Av. Weight (Uncorrected)	384	397	376	380	385
Av. Weight (Corrected)	407	428	426	404	417

Analysis of Variance

Source	d.f.	Sums of Squares (Uncorr.)	Sums of Squares (Corr.)	Mean Squares (Uncorr.)	Mean Squares (Corr.)
Total	113	346477.47	296789.44		
Between	3	8092.73	13044.99	2697.58 n.s.	4348.33 n.s.
Within	110	338384.74	283744.45	3076.22	2579.50

Table 3. Weight of Heifers at One Year of Age

Analysis by Breed of Cow

	Angus	Brangus	Brahman	Hereford
No. Calves	11	17	16	18
Av. Weight	423	484	516	459

Analysis of Variance

Source	d.f.	Sums of Squares	Mean Square
Total	61	394545	
Between	3	61772	20590.7**
Within	58	332773	5737.5

Highly significant

Table 4. Weaning Weight Data by Breeds of Bulls

	Angus	Brangus	Brahman	Charolaise	Hereford	Shorthorn	Total
No. Calves	24	23	13	25	19	10	114
Av. Weight (Uncorrected)	357	367	356	427	407	382	385
Av. Weight (Corrected)	389	402	397	454	442	401	417

Analysis of Variance

Source	d.f.	Sums of Squares (Uncorr.)	Sums of Squares (Corr.)	Mean Squares (Uncorr.)	Mean Squares (Corr.)
Total	113	346477.47	296789.44		
Between	5	83855 74	77032.19	16571.15	15406 44**
Within	108	263621.73	219757.25	3440.94	2034.79

TABLE 5: Weight of Heifers at One Year of Age
Analysis by Breed of Bull

	Angus	Brangus	Brahman	Charolaise	Hereford	Shorthorn
No. Calves	15	13	8	9	12	5
Av. Weight	441	432	450	547	529	457

Analysis of Variance

Source	d.f.	Sum of Squares	Mean Squares
Total	61	394545	
Between	5	128980	25796**
Within	56	265565	4742

Table 6. Weaning Weight Data by Groups

Breeding	Number Calves	Mean (Uncorr.)	Mean (Corr.)	Rank (Uncorr.)	Rank (Corr.)
Ch x Bran	7	442	462	1	2
Ch x Brah	6	431	486	2	1
Her x Ang	4	427	447	3	4
Ch x Ang	5	422	446	4	5
Ch x Her	7	412	424	5	11
Her	6	411	434	6	6
Her x Brah	5	409	455	7	3
Sh x Bran	3	408	428	8	9
Bran	7	396	425	9	10
Brah x Bran	6	387	432	10	7
Brah x Ang	2	382	392	11	15
Her x Bran	4	380	430	12	8
Bran x Her	5	379	411	13	13
Sh x Her	3	374	394	14	14
An x Brah	6	374	424	15	12
Sh x Ang	4	369	386	16	18
Ang x Bran	7	367	391	17	16
Ang	5	359	383	18	19
Bran x Ang	6	354	388	19	17
Brah x Her	2	337	382	20	20
Bran x Brah	5	330	378	21	21
Ang x Her	6	327	357	22	22
Brah	3	288	341	23	23

Analysis of Variance

Source	d.f.	Sums of Squares (Uncorr.)	Sums of Squares (Corr.)	(Uncorr.)	(Corr.)
Total	113	346389.75	296789.44		
Between	22	145309.81	134292.31	6604.99	6104.20**
Within	91	201079.94	162497.13	2209.67	1785.68

Table 7: Steer Data by Breeds of Sires

(Fed limited amounts of concentrates for 168 days on wheat pasture)

	Angus	Brangus	Brahman	Charolaise	Hereford	Shorthorn
No. Steers	10	10	5	17	7	66
Feeder Grade[1]	14.1	14.7	14.2	14.5	15.6	14.2
Slaughter Calf Grade[2]	13.6	14.0	13.6	13.5	15.1	13.7
Slaughter Grade[3]	9.80	9.43	9.06	9.90	11.76	9.94
Feed Lot Gain	285.5	252.0	258.0	312.0	275.0	316.7
Carcass Grade[4]	19.00	20.98	21.20	20.41*	18.32	18.88
Hot Dressing Percentage	54.33	52.83	54.63	56.28*	55.51	55.49
Chilled Dressing Percentage	52.55	51.41	54.72	54.56*	53.90	53.94
Planimeter Area Eye of Lean	7.95	8.50	8.14	10.36*	9.31	8.27
Shearing Strength Tenderness	17.61	21.42	20.39	16.37*	16.59	17.14

[1]Common 3-5, Medium 6-8, Good 9-11, Choice 12-14, Fancy 15-17
[2]Utility 3-5, Commercial 6-8, Good 9-11, Choice 12-14, Prime 15-17
[3]Prime 1-13, Choice 14-18, Good 20, Commerical 22-24, Utility 26-30, Cutter 2-36, Low Cutter 38-42.
[4]Prime 1-12, Choice 14-18, Good 20, Commerical 22-24, Utility 26-30

*One steer not included

Mississippi Station Report

by Ralph Boulware

Work at the Mississippi Station is just starting. Consequently, we have no data to present at this time. Our program will involve 320 to 350 grade cows which are kept at Prairie, Mississippi, on land leased from the Air Force.

This year we are progeny testing five Hereford bulls, two from Montana Line one, one from Texas (a bull which made very good gains on a feeding trial) and two bulls which might be termed "commercial". Data will be gathered on birth and weaning weight and weaning grade of the calves. After weaning, these calves will be placed on winter grazing, and their performance checked there. At this time we are building up or increasing the numbers in the Angus and Shorthorn groups.

Next year we plan to test four Hereford bulls, one Montana line one, one fast gaining bull from Texas, a Polled bull from the Georgia Station and one commercial bull. Angus bulls will be tested if the lines become available. We will continue to build up numbers in both the Angus and Shorthorn groups.

North Carolina Station Report

Given by H. A. Stewart. No copy available.

Evening Session, October 12, 1954

Members of the Technical Committee were entertained at a delicious barbeque put on by members of the Louisiana State University Animal Husbandry Department. Following the meeting, Dr. L. L. Madsen, Head of the Cattle Research Section, Animal and Poultry Husbandry Research Branch, United States Department of Agriculture, addressed the group. A summary of his remarks follows.

"Beef Cattle Research Problems Today and Tomorrow"

by L. L. Madsen

As I review the overall facilities we have for beef cattle research today as compared to 5, 10 or 20 years ago I am amazed at the progress that has been made. The same applies to all regions conducting cooperative research on the improvement of beef cattle, but it is particularly true in the South.

I also find that there is a growing interest in cattle raising in the South as revealed by statistics on cattle numbers and increases by states. I also note that a competitive spirit exists between certain Southern States in cattle production, and this is a healthy situation for the industry.

In observing the cattle industry of the South, I find that a great deal of crossbreeding is being practiced. In breeding research, therefore, we are obligated to work out the most effective systems of crossing, but in doing so we must not overlook or neglect research on linebreeding, line crossing and inbreeding as possible tools for cattle improvement. Crossbreeding invariably brings up the question of heterosis. We are obligated to work out ways and means of crossbreeding that will systematically insure maximum benefits from heterosis, and in order to do this our crossbreeding experiments should be designed so that heterosis may be identified and estimated quantitatively whenever possible.

In my opinion we must continue to give careful attention to techniques used for measuring the growth of bulls and heifers in record-of-performance tests. Additional research is indicated on various problems connected with methods used, such as standardization of animals, length and rate of the feeding period, etc. Dr. Paul Howe of the Animal and Poultry Husbandry Research Branch, after extensive study is convinced that we should pay more attention to the growth characteristics of individual animals by plotting their growth curve rather than relying on group statistics as is often done. I agree with this view and I suggest further that benefit would probably result from studies of feeding techniques. I believe it would be worthwhile to appoint a regional committee to study and review these problems.

As our research results accumulate we are beginning to calculate more and more heritability coefficients involving a number of important production traits of cattle. We should begin to use these estimates of heritability more in planning breeding experiments so that their validity and application may be more fully explored.

More attention needs to be given to meats and carcass quality factors such as tenderness, flavor, distribution of fat, lean and bone, etc. In the past we have limited our quality studies to carcasses from slaughtered animals. It seems that biopsy techniques might be worked out to check such factors as tenderness, muscle fiber size, etc., which may be of value in selecting breeding stock for experimental matings. This may lead to a better understanding of the role of heredity with respect to these factors. This suggestion seems feasible because of certain inconsistencies and differences encountered between certain eating qualities of meat within the conventional carcass grades,

Considerable research attention is being given in the South and elsewhere to the problem of identifying and culling families of cattle where abnormalities appear such as dwarfism, double muscling, uterine prolapse and cancer eye, etc. Before cattle showing or suspected of carrying these traits are eliminated we should make every effort to organize research projects to determine the inheritance of these abnormal developmental tendencies. In the case of dwarfism some

believe that the heterozygote may have been favored in selecting breeding stock. A similar situation might exist in the case of the double muscle gene. Dr. Byerly appropriately suggests that we should systematically study the heterozygote with respect to both of these conditions (dwarfism and double muscle) to determine their effect on development and fleshing characteristics.

Cost and efficiency of gain are equally important with quality of product in maintaining high levels of meat consumption from the American table. Research in meat production should be accompanied by careful cost analysis and, therefore, closer cooperation with departments of Agricultural Economics is desirable.

We have heard a good deal about the butter market in very recent years, but actually the butter market has been in difficulty for a long time Our highest average butter consumption per capita was in 1911 when according to official statistics we consumed 18.4 lbs per capita. In 1934 we approached this figure by averaging 18 3 lbs., but since then there has been a variable decline. In 1952 butter consumption dropped to 8.7 lbs., the lowest since 1909. A combination of factors including price and competing sources of food fats and oils has affected the butter market. A similar trend could affect meat consumption by encouraging the consumption of substitutes for meat. Cattlemen and many others would hate to see this happen. Quality meat economically produced and priced to the public will go a long way toward keeping meat consumption high and the cattle industry strong. Competing sources of high grade protein foods such as cheese, chickens, turkeys and eggs are on the increase. Beef must compete to retain its present place.

Cattle research will benefit a great deal in the future by using information and techniques from many branches of science. Physiology of growth, development and reproduction should receive greater attention and will contribute much to economic production Hormones and other biologically active products will play an increasing role. The use of diethylstilbestrol for fattening steers is a case in point. Wise Burroughs and coworkers of the Iowa Station state " ----- trace amounts of diethylstilbestrol in the feed of fattening steers increased liveweight gains as much as 35 percent ----- and reduced feed costs per unit of gain as much as 20 percent".

Needs for additional research and application of existing knowledge to practical production problems are great. To accomplish this we should emphasize the need of more trained personnel, particularly in the fields of general and specialized physiology, biochemistry and disease control. This will effectively supplement the work in breeding and genetics, feeding and nutrition, management, and carcass evaluation which also need increased emphasis because they are the important keys in solving cattle production problems of today and tomorrow.

I wish to congratulate the University of Louisiana for the fine facilities they have developed for beef cattle research, and to extend to the technical committee, the regional advisor, and our guests official greetings from the U. S Department of Agriculture. Dr T. C Byerly, Chief of the Animal and Poultry Husbandry Research Branch, regrets that he was unable to be with you and participate in the S-10 meetings.

Morning Session
October 13, 1954

The meeting was called to order by Chairman C. S. Hobbs at 8:30 a.m. The early part of the morning was devoted to a symposia of Heat Tolerance Studies. Papers presented on this phase of the program follows:

Heat Tolerance Studies with Dairy Cattle

by J. E. Johnston

The rapid expansion of the livestock industries in the Gulf Coast Area and other subtropical and tropical areas of the world has stimulated interest in the ability of animals to withstand hot climates. We usually speak of this ability of animals as their "heat tolerance". Before we enter on any discussion of "heat tolerance", however, we should define the term. Heat tolerance has usually been defined, in the past, in terms of body temperature and/or respiration rate. The Rhode and Benezra indices are examples of this. We can't deny that these are good measures of an animal's ability to maintain thermal equilibrium, but we are primarily animal husbandmen and are interested in the development of animals capable of maintaining a high level of production under hot conditions. From considerations of the mechanisms of body temperature regulation, it appeared to us that under hot conditions the regulation of body temperature and productive ability might be antagonistic. In order to test this hypothesis we set up studies of lactating dairy cattle during the hottest portions of the summer of 1953. During 1953 we studied 38 Holsteins, 23 Jerseys, and 8 F_1 Red Sindhi-Holsteins. Records of air temperature, humidity, body temperature, respiration rate and milk production of the animals were maintained. As might be expected air temperature (minimum and maximum) and humidity (absolute) were positively correlated with both body temperatures and respiration rates of the Holsteins and Jerseys. Coefficients of correlation ranged from 0.3 to 0.5 and were statistically significant at the 1% level of probability. The crossbred cows showed significant relationships only between respiration rate and the climatic conditions. Milk production of Holsteins and Jerseys was negatively correlated with climatic conditions the highest correlation being -.47 with absolute humidity and in the Holstein breed.

However, we were particularly interested in the relationship between milk production and body temperature and respiration rate. Coefficients of correlation calculated on an among cow within breed basis showed a positive relationship between body temperature and milk production in the Jerseys (+0.11) and Holsteins (+0.50)** and negative in the crossbreds (-0.20). This meant that within the European breeds the higher producers tended to have the highest body temperatures. Respiration rate didn't show clearcut relationships - correlations didn't attain significance. On a within cow basis the coefficients of correlation were all negative for the European breeds.

These results need further confirmation although we have obtained similar results during another summer's work. The genetic correlation has been calculated between body temperature and respiration rate. This was +0.28 thus supporting the phenotypic correlations.

On the basis of this work and other work having similar portent we feel that extreme care should be used in evaluating heat tolerance on the basis of body temperature or respiration rate. The ultimate basis for the evaluation of the heat folerance of domestic animals must be the ability of the animal to maintain production under hot conditions and this measure should be used whenever possible. We realize that the production of milk involves a greater energy expenditure, and thus heat gain, than the process of growth for example, however, doesn't the steer that makes the most rapid gains also have to expend the most energy foraging and digesting feed? The same relationship may still hold here particularly when the evaluation is being made within a breed or at least within a relatively homozygous group.

When dissimilar or heterozygous animals are studied, the situation becomes somewhat different. We have used our Red Sindhi crossbreds, both cows and bulls, in studies both in the field and in the climatic laboratory. In comparing these crossbreds to the respective purebreds we find that they have greater heat tolerance whether we measure it by response with respect to body temperature, milk production level or semen quality and production but not with respect to respiration rate. The question then becomes, "Why do these animals have greater heat tolerance?" I wish that we could give a definite answer to that question but at the present time all we have are indications as to what the mechanism may be. Brody has explained the difference in heat tolerance between Brahman and European breeds on the basis of greater surface area per unit of body weight and lower productive ability. We can't explain the differences among our animals on these basis since many of our crossbreds have less surface area per pound body weight and have produced more milk than the purebred animals to which we compared them. In fact, we can find no indications that the crossbreds eliminate more heat than the purebreds. Therefore, since they exhibit lower body temperatures than the purebreds, the assumption must be that they produce less heat than the purebreds. We have some preliminary data that supports this assumption. Just how we are to reconcile low heat production with high productive rates we can't say at the present time.

Another aspect of our work here at L. S. U. has been an evaluation of the relative importance of ambient air temperature and humidity as stressing factors. Most of the work reported on this subject in the past has indicated that humidity is of little importance in determining animal response to hot climates. However, these workers used relative humidity as their measure of humidity. Initially, as a result of considerations of animal vaporization mechanisms, we tended to agree with the view proposed by Dr. D. H. K. Lee of John Hopkins and others that some measure of absolute humidity was a better measure of humidity stress than relative humidity as proposed by Brody and his co-workers.

We exposed groups of non-lactating Holstein and F_1 Red Sindhi-Holstein heifers to varying conditions of temperature and humidity in the climatic chamber for 8 hour periods. Hourly observations of body temperature, respiration rate and pulse rate were made. The temperatures used ranged from 77°F to 104°F and humidities from 12 to 30 mm of vapor pressure. We found that if we maintained the vapor pressure at the lowest level (15 mm) we could increase temperature to 104°F without any of the animals showing body temperatures (8 hour averages) above 102°F. At 20 mm of Hg. (28% Relative Humidity) the Holsteins exceeded 102 only at 104° while at 30 mm of Hg. (48% RH) the Holsteins exceeded 102° at 95° and the crossbreds at 104 (37% RH). Respiration rates of both breeds tended to rise with increases in either temperature or humidity but at 104° doubling the humidity (15 to 30 mm or 28 - 55% Relative Humid.) also caused a doubling of the respiration rates of the Holsteins (64 to 120). Pulse rates of both breeds tended to increase slightly with humidity but not with temperature. When these data were considered on the basis of relative humidity they became unintelligible since at 77°F a relative humidity of 75% is equal to 12.5 mm while at 104° the same 75% is equal to 42 mm. Thus we found that both temperature and humidity are important and that animals can withstand high temperatures at low humidities quite well, but when both are high the animals respond with high temperatures and respiration rates. In this manner we can explain the difference in response of animals in such diverse areas as Oklahoma where summer temperatures are extremely high with low humidities and Louisiana where temperatures don't go so high but humidities run very high.

In our field studies under hot conditions we have consistently gotten higher correlations between absolute humidity and production than with ambient temperature and production. Some of this may be explained, however, since we usually have had a greater range in humidity than in temperature during our studies.

As a result of all this work on heat tolerance we're not at all sure that crossbreeding is the answer to the problem of Dairying in the South. Several of our F_1's have made good records production-wise and they have definitely shown resistance to hot conditions - we haven't gotten significant correlations between production and climatic conditions as we have in the European breeds. They have also shown the ability to graze more in the sun (2X the Hol.) than the Holsteins and Jerseys. In fact they seldom seek shade while the purebreds remain in the shade almost continuously between 8:00 a.m. and 5:00 p.m. on hot sunny days they also grazed more in each 24 hour period. Despite all this we aren't sure what will happen to production and heat tolerance as we begin to get segregation in future generations. While we are investigating these aspects of crossbreeding we feel that there is much that can be done to obtain better production from our European derived breeds which are already established in the area. We have just completed a study where we compared the milk production of three groups of 10 lactating Holsteins. One group was sent to pasture night and day as we usually do, another group was kept in a shaded area and fed chopped green forage during the day and the third group was kept in the climatic laboratory, maximum temperature 85°F, and fed chopped green forage during the day. All three groups grazed together during the night. The analysis of this study isn't complete but it appears that during most of the summer the animals that

were shaded and fed produced nearly as well as those that were colled while the pasture group showed much more marked responses in production to hot weather. We also appear to be getting good results from fan and water spray devices for the cooling of bulls, thus preventing the summer sterility so frequently encountered in this area. Thus by changing management we may be able to alleviate the effects of hot weather on the cattle we now have.

In conclusion, I feel that, while there is still much to be done in the field, we are beginning to solve some of the problems dealing with the relationship of cattle to hot environments. As these solutions become available, they should enable us to devise systems of management and possibly systems of breeding which will make possible more economical animal production under hot conditions. Whether we shall ever be able to achieve production levels under hot conditions which will equal those achieved under cool conditions I'm not now prepared to say.

Relation of Heat Tolerance Determinations to Productivity of Beef Cattle at Jeanerette, Louisiana

by: E. H. Vernon

A formula known as the Iberia Heat-Tolerance test for cattle, developed by A. O. Rhoad, was used in calculating the heat tolerance coefficients used in this study. The formula is:

$$100 - \underline{/}10(BT - 101)\underline{7}$$

in which BT = average body temperature based on rectal temperature readings (made at 10 a.m. and 3 p.m. on 3 different days) with the average air temperature 85°F. or more (cattle held in unprotected area during test period, with access to water, but having no shade); 101 = normal body temperature of cattle; 10 = a factory to convert degrees deviation in body temperature from the normal to a unit basis; 100 = perfect efficiency in maintaining temperature at 101°F.

With the use of this formula, an animal with an average body temperature of 103.8°F. would have a heat-tolerance coefficient of:

$$100 - \underline{/}10(103.8 - 101)\underline{7} = 100 - \underline{/}10\ (2.8) = 72$$

There were variations in recorded air temperatures. The figures used were adjusted to 90°F. according to regressions worked out by A. L. Baher.

Table No. 1 Brahman x Angus Cows
Correlation of Heat Tolerance Coefficient with Weights by Years

Year Born	Own Birth Wt. N	Own Birth Wt. r	Own 6 Mos. Wt. N	Own 6 Mos. Wt. r	Calves Birth Wt. N	Calves Birth Wt. r	Calves 6 Mos. Wt. N	Calves 6 Mos. Wt. r
1931	3	-0.49	3	-0.97	3	1.0	3	1.0
1932	5	-0.70	5	-0.67	5	0.69	5	0.91
1934	3	0.33	3	0.65	3	0.34	3	-0.59
1935	6	0.23	6	0.36	6	0.26	6	0.35
1937	9	0.02	9	0.42	9	-0.35	9	-0.24
1938	9[a]	0.44	9	0.45	9	0.44	9	0.68*
	(10[b]	0.23	10	0.30	10	0.49)		
1939	5[a]	-0.05	5	0.23	5	0.29	5	0.63
	(7[c]	-0.20	7	-0.11)				
1940	22	-0.03	22	-0.29	22	-0.12	22	-0.09
1941	19[a]	-0.09	19	-0.09	19	-0.29	19	-0.23
	(21[c]	-0.11	21	-0.05)				
1942	10	0.07	10	0.80**	10	0.48	10	0.52
1943	30[a]	-0.28	30	-0.03	30	-0.08	30	0.42*
	(31[c]	-0.31	31	-0.09)				
1944	17[a]	-0.13	17	-0.22	17	-0.27	17	-0.39
	(18[b]	-0.13	18	-0.21	18	-0.30)		
	(21[c]	-0.04	21	-0.13)				
1945	18[a]	-0.40	18	-0.04	18	-0.22	18	-0.14
	(27[c]	-0.26	27	0.22)				
1946	21[a]	0.34	21	0.51*	21	0.34	21	0.32
	(22[c]	0.15	22	0.35)				
1947	17[a]	-0.06	17	0.70**	17	-0.04	17	0.27
	(18[b]	-0.16	18	0.28	18	-0.08)		
	(22[c]	-0.07	22	0.32)				
1948	15[a]	-0.18	15	0.16	15	0.28	15	0.27
	(17[b]	-0.09	17	0.09	17	0.26)		
	(19[c]	-0.14	19	0.13)				
1949	14[a]	0.03	14	0.54	14	-0.16	14	0.28
	(18[c]	-0.02	18	0.88)**				

* Significant at 5% level
** Significant at 1% level

[a] Includes only data from cows with one or more calves which reached 6 months of age.

[b] Includes additional data where birth wt. of calves available but no 6 months weights.

[c] Additional data included from cows with no progeny

Correlation of Heat Tolerance Coefficients with Weights of Brahman x Angus Cows
Pooled Data

Cow's Own Birth Wt.			Cow's Own 6 Mos. Wt.		
N	b	r	N	b	r
223[a]	-0.36	-0.05	223	-0.48	-0.09
228[b]	-0.35	-0.05	228	-0.56	-0.11
256[c]	-0.32	-0.05	256	-0.40	-0.06
259[d]	-0.33	-0.05	259	-0.42	-0.05

Calves Birth Wt.			Calves 6 Mos. Wts.		
N	b	r	N	b	r
223	-0.06	-0.07	223	0.42	0.09
228	-0.04	-0.04	-	-	-
-	-	-	-	-	-
231	-0.04	-0.05	226	0.41	0.09

[a]Includes only data from cows and calves where cow produced at least one calf reaching 6 months of age.

[b]In addition to item a, includes data from cows producing one or more calves, none of which reached the age of 6 months.

[c]In addition to item b, includes data from cows which produced no calves.

[d]Includes data from 1933 (one cow) and 1936 (two cows).

Africander x Angus Cows

Correlation of Heat Tolerance Coefficient with Weights by Years

Year Born	Own Birth Wt. N	Own Birth Wt. r	Own 6 Mos. Wt. N	Own 6 Mos. Wt. r	Calves Birth Wt. N	Calves Birth Wt. r	Calves 6 Mos. Wt. N	Calves 6 Mos. Wt. r
1939	7	0.29	7	0.53	7	0.16	7	-0.37
1940	6	0.47	6	0.60	6	-0.01	6	-0.15
1941	7	-0.44	7	-0.25	7	-0.04	7	0.43
1942	7[a]	0.03	7	0.08	7	-0.30	7	0.31
	(8[c]	-0.0004	8	0.08)				
1943	5	-0.79	5	-0.08	5	-0.41	5	-0.64
1944	5	0.21	5	0.43	3	0.19	5	0.06
1945	5[a]	-0.38	5	0.47	5	-0.33	5	-0.85
	(6[c]	-0.40	6	0.82)				
1946	2[a]	--	2	--	2	--	2	--
	(5[c]	-0.22	5	0.04)				
1947	2[a]	--	2	--	2	--	2	--
	(4[b]	-0.22	4	-0.39	4	-0.49)		
	(5[c]	-0.19	5	-0.75)				

[a] Includes only data from cows with one or more calves which reached 6 months of age.

[b] Includes additional data where birth weight of calves available but no 6 months weights.

[c] Additional data included from cows with no progeny.

Table No. 4

Correlation of Heat Tolerance Coefficients with Weights of Africander x Angus Cows Pooled Data

Cow's Own Birth Wt.			Cow's Own 6 Mos. Wt.		
N	b	r	N	b	r
44[a]	0.17	0.10	44	1.12	0.18
48[b]	0.13	0.08	48	0.01	0.15
58[c]	0.02	0.01	58	0.01	0.17

Calves Birth Weights			Calves 6 Mos. Weights		
N	b	r	N	b	r
44	-0.01	-0.01	44	-0.39	-0.14
48	0.07	-0.08	-	-	-
52	-0.06	-0.07	50	-0.32	-0.11

[a] Includes only data from cows and calves where cow produced at least one calf reaching 6 months of age.

[b] In addition to item a, includes data from cows producing one or more calves, none of which reached the age of 6 months.

[c] In addition to item b, includes data from cows which produced no calves and from years having data on less than 3 cows.

Table No. 5

Correlation of Heat Tolerance Coefficients with Weights by Years Purebred Brahman Cows

Year Born	Calves Birth Wts.			Calves 6 Mos. Wts.		
	N	b	r	N	b	r
1937	5	-	0.38	5	-	0.64
1947	11	-	0.24	11	-	0.29
Pooled	16	0.11	0.14	16	1.44	-.49

Heat Tolerance Studies at Bluebonnet Farm, McGregor, Texas

T. C. Cartwright

There is much evidence in the literature indicating that production is lowered in cattle during the summer in tropical and subtropical areas and that indigenous tropical breeds are more heat tolerant than exotic breeds Little work has been reported on the physiological and anatomical differences responsible for varying degrees of adaptability.

In this study a heat chamber was used to subject eight animals simultaneously to temperatures of 105°F. and relative humidity of 50% for an eight-hour period. A total of 366 animal observations were made. Analyses of the data showed significant breed differences with Herefords high, Brahmans low and the F_1 between these intermediate for body temperature and respiration rate. Similar differences were found for respiration rate taken in the field and weight gain during the summer in shadeless pastures except that the order for gain (high to low) was F_1, Brahman and Hereford. Correlations between the above characters and some others that appeared to be related to heat tolerance were mostly significant but of low magnitude. See Tables 1, 2, 3 and 4.

Summer gain, only, was found to be sufficiently high in heritability (19 percent) to indicate usefulness in selection. Summer gain and winter gain appeared to be negatively correlated on a breed basis but independent within breeds. It appears that summer gain will be more useful in selection for heat tolerance under practical conditions than any other measure studied.

TABLE 1. Averages and Numbers by Breed or Cross and Sex of Av. Chamber Body Temperature, Av. Chamber Respiration Rate, Av. Chamber Pulse Rate, Av. Field Respiration Rate and Weight Gain During Summer.

	Av. Chamber Body Temp.		Av. Chamber Resp. Rate		Av. Chamber Pulse Rate		Av. Field Resp. Rate		Summer Gain	
	n	°F	n	no/min.	n	no./min.	n	no./min.	n	lbs.
Hereford (H) Bulls	23	103.6	23	121.1	19	69.0	8	86.5	4	-22
Brahman (B) Bulls	33	102.2	33	69.4	33	67.3	11	45.5	9	-05
Santa Gertrudis Bulls	1	102.6	1	94.3	1	61.3	1	54.0	1	30
F_1 (HXB) Bulls	16	102.7	16	87.3	16	74.5	3	61.1	1	15
3/4B-1/4H Bulls	2	102.6	6	93.6	2	73.5	2	51.5	--	--
Hereford Heifers	94	103.0	94	102.2	94	67.2	31	95.2	30	8
Brahman Heifers	24	102.4	24	62.1	24	65.5	8	47.7	9	40
Santa Gertrudis Heifers	6	102.9	6	71.3	6	59.0	4	60.0	--	--
Red Poll Heifers	3	103.4	3	109.2	3	63.4	3	94.6	--	--
F_1 (HXB) Heifers	145	102.4	145	73.3	145	67.0	39	59.6	39	54
Hereford Steers	19	104.5	19	107.4	--	--	--	--	--	--

TABLE II.

Analyses of Variance of Av. Chamber Body Temperature, Av. Chamber Respiration Rate, Av. Chamber Pulse Rate, Av. Field Respiration Rate and Weight Gain During the Summer.

Source of Variation	Av. Chamber Body Temp. D.F.[1]	M.S.[2]	Av. Chamber Resp. Rate D.F.	M.S.	Av. Chamber Pulse Rate D.F.	M.S.	Av. Field Resp. Rate D.F.	M.S.	Summer Gain on Pasture D.F.	M.S.
Between Sexes	2	31.23**	2	5,375.05**	1	2,111.09**	1	2,179.94**	1	69.00
Between Breed or Cross Within Sex	8	6.27**	8	12,252.09**	8	143.60*	8	4,500.38**	5	11,104.82**
Error	355	0.54	355	341.88	333	71.60	97	48.80	85	1,036.26

1. Degrees of Freedom
2. Mean Square

* Statistically significant at the 0.05 level of probability.
** Statistically significant at the 0.01 level of probability.

Table III. Correlation Coefficients

Character	Type of r	Chamber body Temp.	Chamber Resp. Rate	Field Resp. Rate	inter Gain
Chamber Body Temp.	O[1]			.53**	-.09
	W[2]			.15**	-.06
Chamber Resp. rate	O	.52**		.59**	.05
	W	.29**		.14**	.06
Summer Gain	O	-.22**	-.23**	-.31**	.02
	W	-.17*	.05	.05	.02
Color[3]	O	-.37*	-.24*	-.46**	
	W	-.15	.21	-.18	
Age in days	O	-.32**	-.03		
	W	-.15**	.44**		
Chamber Rel. hum.	O	.06	.48**		
	W	.12**	.34**		

1 Over-all.
2 Within breed or cross and sex.
3 Subjectively scored on a scale from 0 to 100 so that the numerical value is an estimate of the percent of light the hair coat would reflect in the sunlight.

* Statistically significant at the 0.05 level of probability.
** Statistically significant at the 0.01 level of probability.

Table IV. Analyses of Variance of Av. Chamber Body Temperature, Av. Chamber Respiration Rate, Av. Field Respiration Rate and Weight Gain During the summer.

Source of Variation	Av. Chamber Body Temp.		Av. Chamber Resp. Rate		Av. Field Resp. Rate		Summer Gain on Pasutre	
	D.F.[1]	M.S.[2]	D.F.	M.S.	D.F.	M.S.	D.F.	M.S.
Between Sexes	2	26.89**	2	4,393.26**	1	2,179.94**	1	69.00
Between Breed or Cross and Sex	4	13.13**	4	19,059.04**	4	9,408.47**	2	25,684.50**
Between Sires Within Breed or Cross and Sex	47	.21	47	297.48	24	20.33	19	1,677.53**
Error	182	.54	182	301.08	77	33.96	70	890.91

1. Degrees of Freedom
2. Mean Square.

** Statistically significant at the 0.01 level of probability.

At the close of the discussion on Heat Tolerance Work, Chairman Hobbs called on E. J. Warwick for any remarks he might care to make. Dr. Warwick discussed the status of the regional project and passed out material giving cattle inventories and reports on financial support, mostly summarizing material sent in by Technical Committemen earlier. These summaries are found on the following pages.

In addition, Dr. Warwick discussed some phases of Dwarfism Research as follows:

Suggestions on Dwarfism Work

by: E. J. Warwick

Several stations are doing dwarfism research on specific problems. This discussion does not refer to them.

In addition to these specific projects there are problems on which all stations can help out whether engaged specifically in dwarfism work or not. Three such problems together with some suggestions for work on them follows:

Problem 1.

Characterization of Dwarfs

Although the conventional or snorter type dwarf occurring in at least the Hereford and Angus breeds seems to have been reasonably well described, the variation which can be expected in these dwarfs has not to date been determined.

Dwarfs apparently of other types are being encountered in the South and the genetics of some of these are being studied by the Florida and Louisiana stations. It is hoped that as time goes on enough information will be accumulated to permit the identification of dwarfs according to genetic types.

Problem 2.

Identification of Dwarfs

The apparent lack of differentiation between normal animals and dwarfs of at least some types using available criteria for reparation makes it desirable that further study be given the problem.

The problem is often particularly acute in the case of still-born calves.

Problem 3.

Testing the Usefulness of the Profilometer.

The profilometer has unfortunately become a controversial matter -- its partisans have attempted to promote its use on a wide scale and in at least some cases apparently still believe it is capable of predicting genotypes for dwarfism and of virtually solving the dwarf problem alone. Others doubt its usefulness and have data to substantiate their viewpoint. However, research workers have an obligation to test such a technique. If found useful a contribution will have been made to the industry. If found to be not useful, the data should be published in order to clarify the situation.

SUGGESTED PROCEDURES.

I. That all dwarf calves or suspected dwarf calves dropped in any station herd be raised if possible and kept until the Regional Coordinator has had a chance to examine and measure them after which it will be determined whether they might constitute useful research material for breeding tests.

II. That all stations whether doing dwarf research or not make all dwarf or suspected dwarf animals not needed in their own programs available for use in other stations if and when they would be useful.

III. In the case of stillborn calves or calves dying quite young in which there is any suspicion of abnormality that the following procedures be followed:

1. Where interested and competent pathologists are available that complete post mortems be carried out with the following parts to be preserved:

   a. Head

   b. One front leg (or the cannon bone if entire leg can't be frozen).

   c. Lumbar vertebrae (all vertebrae from last rib to sacrum).

2. Where competent pathologists are not available the entire calf should be frozen if possible pending arrangements to send it to another station If this is not possible then the head, front leg, and lumbar vertebrae should be frozen and saved for examination by others later.

IV. That all dwarfs not needed for further work be subjected to complete post mortems and the lumbar vertebrae, one cannon bone and half the skull be preserved. Special attention should be paid to the presence or absence of hydrocephalus .

V. That specimens for histological examination be preserved from all dwarfs or suspected dwarfs according to procedures which will be furnished as soon as the Animal and Poultry Husbandry Research Branch employs a histologist. These tissues along with suitable control tissues where available can then be forwarded to Beltsville.

VI. That arrangements be made to have the Regional Coordinator or other persons with experience profile all bulls of the British breeds used in research herds. Over a period of years the information thus collected when studied in relation to the occurrence of dwarfism (or its failure to occur) will help evaluate the technique.

It is furthermore suggested that all unselected bull populations twelve months of age or over where there should be any predictable frequency of carrier animals be profiled to determine if there is any relationship between profiles and expected frequencies of genotypes. It would probably be desirable to profile all ROP bulls at 12 to 18 months of age regardless of amount of selection that has occurred among them.

VII. That pedigree records of all dwarf or suspected dwarf animals be kept.

Remarks by J. O. Grandstaff

Chairman C. S. Hobbs called on Dr. J. O. Grandstaff of the Office of Experiment Stations for any remarks he might have regarding the S-10 project. Dr. Grandstaff briefly outlined the reasons for regional research work and commended the S-10 Committee for the type of program it had at the 1954 Technical Committee meeting. Much of the discussion was on the actual work of several projects and every member of the Committee had an opportunity to discuss the work and offer suggestions. In his opinion, this was fulfilling the true purpose of regional projects.

He urged that attention be given to the inclusion of more basic physiology work and to work with monozygotic twins in connection with problems where they would be useful.

	Current 9b3 Allot.	Current APH Allot. for Cooperative work. Former 10b	Dwarfism	Fiscal 1954 expenditures State* Capital Outlays	Operation	9b3	APH	Inventory Value of various projects July 1, 1954 Cattle (total value)	Cattle (adj. % use)	Land & Equip.
Alabama	3,000	-	-	1,017	31,430	3,000	-	47,100	47,100	117,732
Arkansas	8,000	2,400	-	4,500	34,490	6,500	2,400	91.940	87,343	216,886
Florida:										
State Stations	-	-	2,500	8,597	27,543	-	-	171,670	111,586	203,974
Fed. Sta., Brooksville	-	-	-	-	5,638	-	39,768	38,935	38,035	**
Georgia	-	-	-	1,800	15,000	-	4,320	81,400	65,120	19,500
Kentucky (New Project)	8,000	-	-	18,000	-	-	-	-	-	18,000
Louisiana:										
State Station	2,000	-	2,000	21,870	17,850	-	-	115,825	115,825	101,631
Fed. Station Jeanerette	-	-	-	-	23,500	-	30,000	74,600	74,600	**
Maryland	-	-	-	2,639	17,725	-	-	55,925	37,470	178,831
Mississippi (New Project)	2,000	-	-	-	20,372	-	-	41,700	31,275	60,000
North Carolina	2,500	1,500	-	4,478	36,317	2,500	1,500	126,100	49,179	107,474
South Carolina	-	-	-	3,450	9,852	-	-	14,425	14,425	30,750
Tennessee	6,500	2,400	3,000	23,850	25,000	6,500	2,400	254,708	150,276	158,300
Texas	8,500	5,000	3,500	-	105,491	8,500	5,000	137,450	122,650	443,300
Virginia:										
State Stations	8,000	3,600	2,500	3,350	38,266	3,200	3,600	38,845	26,658	107,837
Fed. Sta. Fr. Royal	-	-	-	-	47,418	-	27,368	130,425	130,425	**
Totals	48,500	14,900	13,500	94,549	454,892	30,200	116,356	1,420,348	1,101.969	1,764,215

* Includes state appropriations, receipts , and federal grant funds directly under state control.
** No attempt made to put a value on federal station property.

	Cattle Inventory July 1, 1954*							1953 - 54 Cattle Fed After Weaning Under Test Cond.					
								Bulls		Steers		Heifers	
	Cows 2 Yrs. & Over	Yr. Heifers	Bulls 1 Yr. & Over	Steers 1 Yr & Over	Calves Under 1 yr. Male	Calves Under 1 yr. Female	% Use on Proj.	Group Fed	Ind. Fed	Group Fed	Ind. Fed	Group Fed	Ind. Fed
Alabama	77	43	9	--	22	31	100	68	--	--	--	18	--
Arkansas	203	79	16	32	47	48	95	--	50	--	--	--	15
Florida:													
State Sta.	724	180	38	173	171	168	65	--	--	81	--	32	--
Fed. Sta.													
Brooksville	173	36	20	--	45	46	100	--	--	--	--	--	--
Georgia	159	27	9	--	60	56	80	35	--	--	--	45	--
Kentucky	--	--	--	--	--	--	--	--	--	--	--	--	--
Louisiana:													
State Sta.	254	73	7	1	56	58	100	--	--	55	--	--	--
Fed. Sta.													
Jeanerette	180	44	22	--	75	52	100	--	20	30	--	3	--
Maryland**	60	12	2	13	19	23	67	--	--	11	16	11	15
Mississippi	350	37	10	--	120	120	75	--	--	--	--	--	--
North Carolina	279	88	20	--	110	91	39	13	--	37	--	21	--
South Carolina	51	8	4	--	-21-		100	--	--	--	--	--	--
Tennessee	882	294	55	--	298	268	59	25	--	--	--	12	--
Texas	548	114	47	--	235	222	89	255	--	109	--	247	--
Virginia:													
State Sta.	109	50	3	42	41	42	66	--	--	39	24	6	34
Fed. Sta.													
Fr. Royal	443	98	32	19	131	128	100	--	43	--	--	99	--
Total	4492	1183	294	280	1440	1364		396	113	362	40	494	64

* Includes all cattle on each station whether owned by state, U.S.D. ., or cooperating breeders.
**Does not include cattle in an outside cooperating herd.

Remarks by R. E. Patterson

Chairman C. S. Hobbs next called on Dr. R. E. Patterson, Administrative Advisor of the S-10 Project, for any material he might like to present.

Dr. Patterson indicated that it had been a pleasure working with the S-10 Project over the years and indicated that he was pleased to see so many of the people who had been responsible for originating the project in 1948 still active in the work. He wondered if coordinated research helps keep staff members happy and on the job.

He pointed out that the job of Administrative Advisor is primarily that of providing liaison with the state experiment station directors of the Region. He complimented the group for making his job easy by furnishing him information as needed. He also commented on one situation in which some research workers were loath to give full informal reports of the progress of their work for fear that such results would be misused by other workers. He indicated that he felt it was an extremely healthy situation that every member of the S-10 Technical Committee had apparently felt free to report results fully and to discuss them with other members of the Committee. He felt that this mutual trust was necessary if the full potentialities of cooperative research were to be realized and expressed the hope that the present healthy situation in the S-10 Group would continue.

He discussed briefly the change in the method used for allocation of 9b3 funds during the past year. These funds are now allocated to the various states by formula and the allocation to individual projects such as Beef Cattle Breeding is at the discretion of the Director involved. The amount being alloted to the S-10 Project is currently $18,000 per year.

Dr. Patterson pointed out that the Committee of Nine is now taking a more active part in the review of both regional and state contributing projects than was the case in the past and that they are now using the authority vested in the Committee of requesting revision and/or termination of projects. The S-10 Project was reviewed by the Committee of Nine in March, 1954, and complimented highly by the Committee He indicated his pleasure at this report and felt that it should be a source of pride to every member of the Committee.

Dr. Patterson indicated that both of our regional and state contributing projects should be examined critically during the coming year for possible revision if this seemed desirable or necessary. He discussed briefly the situation on the inclusion of related problems such as low-fertility and sterility in the S-10 Project. He indicated that he felt such work was needed and was likely to be productive but that he feels we shouldn't scatter our shots too widely. Since S-10 is a breeding project he feels we should confine our work to things likely to have a genetic basis.

He also pointed out that the Southern directors now examine state contributing projects rather critically.

Business Meeting of the S-10 Technical Committee
October 13, 1954, 11:00 a.m.

The annual business meeting of the S-10 Technical Committee was called to order by C. S. Hobbs at 11:00 a.m. October 13, 1954. Dr. Hobbs recommended that reading of the minutes be dispensed with since they had been mimeographed and distributed to all members. There being no objections the minutes of the previous meeting were not read. Marvin Koger reported briefly on an informal meeting of the Executive Committee held the previous evening and pointed out that the Committee had taken no official action on any question but had discussed the following matters:

1. Potential use of 9b3 funds being reserved by the Directors for use on regional aspects of projects rather than being allocated directly to states. Possibilities discussed included the sponsoring of a school dealing with the use of IBM equipment for handling data and using the money to make a study of some specific problem or project involving data from several stations in the region.

2. Quite a lot of discussion was held on the problems of fertility, sterility, and reproduction in beef cattle.

3. The time of meeting for next year was discussed with the opinion of those present being that it would be preferable to have the meeting sometime in early October rather than earlier in the year.

4. L. L. Madsen discussed the allocation of dwarfism research money in the Southern Region. The essential points in this discussion were:

From a special appropriations made by the last Congress specifically for dwarfism research the following allocations have been made in the Southern Region:

Florida	$2500.00
Louisiana	2000.00
Tennessee	3000.00
Texas	3500.00
Virginia	2500.00

The Florida and Louisiana Stations are planning to investigate the genetic relationships between dwarfs differing in appearance and of various breeds.

The Texas Station is planning to investigate biochemical characteristics of dwarfs as compared to normal animals.

The Virginia Station is planning an investigation of physiological and biochemical characteristics of dwarfs as compared to normals.

At the Tennessee Station investigations are underway on the use of X-ray technique developed by L. N. Hazel of Iowa State College, as a possible means of differentiating between carrier and non-carrier normal animals.

Dr. Hobbs then called for committee reports. The following reports were presented:

1. Report of Committee on Cooperative Analysis of Data and Publications:

The Committee met October 13 to give consideration to possibilities for pooling of data, cooperative analysis and publication of results by two or more states within the Region.

The Committee wishes to commend E. J. Warwick, C. J. Brown, H. A. Stewart, W. W. Green and H. J. Smith for their efforts in pooling, analysis and the preparation for publication of the available information in the region concerning the "Relationship between type scores and live animal measurements in beef cattle".

The above undertaking illustrates the needs and possibilities for further pooling of data for analysis and publication when numbers are small within individual state projects.

The Committee wants to encourage each worker in the Regional project to analyze and interpret his own data.

The Committee also wants to state that any plan initiated for the pooling and analysis of data at some central point or laboratory should not interfere or adversly influence the worker in the presentation of his results but rather to encourage all workers to pool data that may fit into studies of other workers in the Region.

The Committee recommends that the Regional Coordinator continue to initiate cooperation between states in pooling data, its analysis, its interpretation and finally publication.

It would seem fitting that a Committee be appointed to assist the Coordinator in this undertaking.

Respectfully submitted,

H. A. Stewart
B. L. Southwell
Warren Gifford, Chr.

Some discussion of points made by this Committee followed the Report. Dr. K. E. Gregory moved the adoption of the report, and the appointment of a Committee by the incoming Chairman, Dr. Koger, and the Regional Coordinator to work on the problem. Motion seconded by E. G. Godbey, motion passed.

2. Report of Committee on Livestock Exchange:

The laws and policies vary greatly from state to state in the Southern Region. Since the S-10 Technical Committee has no direct control over these laws and policies, the Committee on Exchange of Livestock recommends the adoption of the following by the Technical Committee:

1. That the specific policies and agreements regarding exchange, loan, or sale of animals between Experiment Stations in this Region be left to the stations involved with the stations working out their own agreements.

2. That the Technical Committee recommend to the Directors and Animal Husbandry department heads that a favorable attitude be taken toward the loan and exchange of animals between stations for research purposes. Excessive prices should not be charged cooperating stations when animals are sold outright. When loans between stations are made, no insurance should be required.

B. L. Warwick
H. J. Smith
C. E Lindley, Chr.

B. L. Southwell moved the acceptance of this report. Seconded by J. L. Foster, motion passed.

3. Report of the Committee on the Use of IBM Equipment in Beef Cattle Breeding Research.

The Committee feels that the use of IBM equipment has great potentialities for increasing efficiency in record keeping and analyses of data collected in connection with the S-10 Southern Region Beef Cattle Breeding Project. Therefore, the Committee recommends that each person investigate the IBM facilities available at their respective stations and familarize themselves with the equipment and procedures involved in the use of such equipment.

C. M. Kincaid
L. J. Warwick
T. C. Cartwright, Chr.

In addition to the formal report of this Committee, T.C. Cartwright discussed in some detail the use being made of IBM equipment by the Texas Station and Dr. Kincaid discussed the progress which had been made at the Virginia Station in using IBM equipment primarily for data collected in a field testing program on beef cattle.

The Chairman then called for the report of the Resolutions Committee. The following resolutions were offered and adopted by the Technical Committee:

1. BE IT RESOLVED that the S-10 Technical Committee express their deep appreciation to Dr. R. T. Clark for his thoughtful guidance and aggressive leadership during the formation, the period of development and the early years of the S-10 Beef Cattle Breeding Project.

   BE IT FURTHER RESOLVED that the secretary shall write Dr. Clark sending him a copy of this resolution and expressing our appreciation for his tireless efforts in our behalf.

2. BE IT RESOLVED that the S-10 Technical Committee commend the APH Branch of ARS for their efforts in obtaining additional funds for a sound, broad approach to the study of dwarfism, an increasingly important problem in beef cattle breeding in this Region.

   BE IT FURTHER RESOLVED that the APH Branch of ARS be urged to put forth every effort to obtain additional support for increasing and implementing present cooperative beef cattle breeding work with the states of this Region.

3. BE IT RESOLVED that the secretary express the appreciation of this group to Dr. K. P. Brown, President of the Chamber of Commerce of Jeanerette, to those on the station staff and to those responsible for the excellent shrimp and crab dinner at the roadside park near the New Iberia Station on Monday noon.

4. BE IT RESOLVED that the secretary write a letter of appreciation to Cajon George D. McIntire of Lafayette, Louisiana for his excellent entertainment after the dinner on Monday.

5. BE IT RESOLVED that this group shall express our appreciation to Dr. Damon and his coworkers for their cordiality and hospitality in making our stay here confortable and enjoyable by standing, and that our secretary express our thanks in writing to this group.

6. BE IT RESOLVED that the secretary write a letter of appreciation to Professor Francioni and his congenial, willing and able staff members who provided the bountiful barbecue supper last evening.

7. In appreciation for the most hospitable reception, the fine tour and wholesome fellowship during our pleasant stay on the New Iberia Station, I should like to have Cajon Colonel E. H. Vernon stand.

   On behalf of the S-10 Tenchical Committee, I hereby present to you a Corn Cob Cluster as a token of our sincere appreciation for your efforts. May you preserve it and remember this group when you look upon it.

In addition to the resolutions adopted, the Resolutions Committee offered a resolution that the Secretary write a letter to Secretary of Agriculture Benson urging that the Charolaise cattle allegedly smuggled into the United States last year and now held in quarantine at Lafayette, Louisiana be made available for research in case the cattle are not returned to Mexico by the owner.

Considerable discussion took place on this resolution. Several members of the Committee expressed the belief that this was an area in which the Committee should not become involved. Dr. L. L Madsen indicated that he would be glad to see that the matter was brought to the attention of the Secretary and expressed the belief that it could be handled better in this manner than by the adoption of a resolution. B. L. Southwell moved that the resolution not be adopted. Many seconds were heard, motion passed.

The Chairman then brought up the question of the 1955 meeting for discussion. Invitations were tendered by H. A. Stewart for North Carolina, by B. L. Warwick for Texas, by Warren Gifford for Arkansas, and by B. L. Southwell for Georgia.

After considerable discussion B. L. Southwell moved that the matter be left up to the Executive Committee. This motion failed for want of a second.

Keith E. Gregory moved that we meet at North Carolina in 1955. There were many seconds to the motion. Motion carried. It was indicated that H. A. Stewart would select the exact dates for the meeting in consultation with the Executive Committee. Feeling of the group seemed to be that the best time for the meeting would be in early October if this was satisfactory with the host institution.

The system used in electing members of the Executive Committee in which one new member is elected each year and serves the first year as an Executive Committee member, the second year as Secretary and the third year as Chairman, was briefly reviewed for the group. Marvin Koger of Florida will be Chairman and Bruce L. Warwick of Texas, Secretary in 1955. R. A. Damon, Jr. of Louisiana was elected as the third Executive Committee Member.

Meeting adjourned at 1:15 p.m.

Marvin Koger, Secretary

ANNUAL REPORT, COOPERATIVE REGIONAL PROJECTS

Provided for Under Sections 9b3, 10b, and 11,
Research and Marketing Act
February 1, 1954

1. PROJECT:

S-10 -- The Improvement of Beef Cattle for the Southern Region Through Breeding Methods.

2. COOPERATING AGENCIES AND PRINCIPAL LEADERS:

The following agencies and state experiment stations are cooperating in this project with the personnel listed comprising the Technical Committee:

Bureau of Animal Industry, USDA	R. T. Clark, E. J. Warwick
Alabama	Keith E. Gregory
Arkansas	Warren Gifford
Florida	Marvin Koger
Georgia	B. L. Southwell
Louisiana	Richard A. Damon, Jr.
Maryland	J. E. Foster
Mississippi	C. E. Lindley
North Carolina	H. A. Stewart
South Carolina	E. G. Godbey
Tennessee	C. S. Hobbs
Texas	B. L. Warwick
Virginia	C. M. Kincaid

Administrative Advisor - R. E. Patterson, Texas

3. NATURE OF WORK, AND PRINCIPAL RESULTS OF THE YEAR:

A. General Nature of Work.

The Southern Regional Beef Cattle Breeding Project is being developed along broad lines to study problems in this field which, until recent years, has been largely neglected by research workers. Most breeding animals in the project contribute information of several types and thus contribute to more than one of the four phases of work which are: (1) Development of measurement methods and selection criteria, (2) Estimating the heritability of characters of productive importance in beef cattle, (3) Assessment of the productive value of cattle from various sources and of different breeds or types, and (4) Comparisons of different breeding systems. The first two of these phases have to do with developing methods for assessing the productivity of beef cattle and with utilizing heritability estimates of various traits in conjunction with economic importance in determining the relative importance various factors should have in selection programs. The last two phases have to do with the utilization of criteria developed to date for the evaluation of cattle of different strains or breeds or those produced by different breeding methods.

B. Scope of Work, New and Revised Contributing Projects and Additions to Facilities.

According to inventory figures submitted July 1, 1953, there were 3,530 females of breeding age (2 years old or older) in use in the project. This figure probably gives the best available picture of project size although the figures of 790 yearling heifers, 247 bulls, and 2,359 calves under one year are also indicative of project activity. It should be noted, however, that in some cases these animals are also used for other purposes, thus lessening somewhat their usefulness for this project. During the winter 1952-53, 515 bulls, 256 steers and 572 heifers were fed under performance testing conditions. In addition, growth records and periodic type scores are kept on all replacement heifers whether on dry-lot performance trials or not.

One new project was added during the year. The Mississippi station initiated a project during the year which will involve progeny testing of bulls from different inbred lines and outbred strains of beef cattle. This project should be valuable in early years in continuing the search for productive cattle in existing strains. It will become increasingly useful in future years for assessing the value of lines developed at other locations in the project. The inclusion of Mississippi as an active participant makes a total of twelve state experiment stations cooperating in the regional project. The three U. S. Department of Agriculture beef cattle stations located at Brooksville, Florida; Front Royal, Virginia; and Jeanerette, Louisiana are also a part of the regional project and are in each case operated in cooperation with the state experiment station in the state where located.

The Georgia station initiated work during the year on a revised study in which different groups of Polled Hereford cattle are selected for single performance items (weaning weight, rate of feed-lot gain) so that progress can be compared with that in a group where several factors are included in selection.

The Florida station began the activation of a study at the Ona station to compare the performance of British and Brahman cattle and their crosses on three levels of nutrition.

Most stations in the region are now stocked with cattle to the approximate capacity of facilities available and most increase in cattle numbers (other than the purchase of bulls) has been by natural increase. Eleven Red Polled females were purchased by the Texas station, 26 Brahman heifers were secured on loan from breeders by the Texas station, and 15 additional Santa Gertrudis heifers were secured on loan by the Brooksville, Florida station.

Additions to facilities included the construction of two feeding sheds at the Alabama station, the construction of fences and corrals at the Arkansas station, the clearing of 125 acres of land at the Louisiana station, the construction of corrals and a herdsman's house at the Maryland station, construction of fences and corrals at the Mississippi station, and the construction of a controlled temperature chamber at the Texas station.

C. Research Results of the Year.

The regional project has been active since 1948, and there is thus a considerable body of data accumulating which is becoming increasingly useful. All stations have engaged in analysis and summarization of data during the past year. Since this is a continual process, some of the results reported are amplifications and substantiations of material reported from preliminary data in previous years. During the past two years it has been possible to study data on certain subjects from several locations in the region and pool or compare the results. The following represent the more important findings during the past year:

1. Estimates of the heritability of ability to gain based on sire offspring regressions at the Virginia station have thus far averaged 22 percent for steers in the feedlot and 15 percent for grazing heifers. Estimates of feedlot gaining ability from half-sib correlations at the Texas station based on considerably larger numbers (853 head) have been 38 percent and for 587 head all raised on the Bluebonnet Farm have been 34 percent. Parent offspring regression on 81 pairs gave an estimate of 57 percent. The estimates from these stations are probably illustrative of the fact that different populations vary in the amount of genetic diversity. Sampling errors may also well be involved. In any event, selection for ability to gain should be effective.

2. Not enough time has elapsed since the beginning of this project to permit actual estimates of selection effectiveness with cattle (average generation interval $4\frac{1}{2}$ to 5 years), but the high average rating of the progeny of fast gaining sires at the Texas station, and the fact that four station bred bulls at the Georgia station where a selection program has been underway for some time gained more than three pounds per day on test in 1953, are suggestive.

3. Relationships of live animal measurements to type scores assigned on the basis of visual appraisal were studied at the Arkansas and Tennessee stations by use of multiple correlation and regression techniques. Results indicated relatively low relationships with 42 to 85 percent of the variance in type scores remaining after taking out all that could be accounted for on the basis of the measurements. Data from the Front Royal, Virginia station suggest a reasonably high relationship between type scores and the ratio $\frac{\text{depth of chest}}{\text{height at crops}}$. Data from the same station indicate a very low predictive value of birth measurements and scores on later performance.

4. Repeatability of weaning weights of calves from different cows has been studied further at the Tennessee, Florida, Georgia and Arkansas stations. These studies (as summarized together with previously published material by Koger of Florida) indicate some variation in repeatability from herd to herd but values were positive in all except one herd (a privately owned one) where management was known to have lacked uniformity. This indicates that low producing cows can be safely culled from a herd.

5. A summary by Smith of Tennessee on the effects of sex of calf and age of dam on weaning weights of calves showed considerable variation from station to station but no definite evidence of breed differences. Bulls averaged approximately 37 pounds and steers 24 pounds heavier than heifers. Calves weaned from cows 6 to 8 years of age were 41 to 76 pounds heavier in different herds than those weaned from 3-year-old cows. Adjustments need to be made for the effects of sex and age of dam in evaluating weaning weights.

6. Studies at the Maryland station relating live animal measurements to carcass yields of various cuts indicate a significant positive relationship between certain body width measurements and yields of high priced cuts when live weight is held constant. The predictive value of this relationship is low, however.

7. In rather extensive studies at the Texas station in which steers were killed and the various carcass cuts weighed and separated into bone, lean and fat, no consistent or significant differences could be demonstrated within breeds between sire progenies in dressing percentage, yield of high priced cuts, or percentages of bone, lean and fat. Thus, the usefulness of such detailed carcass studies as an aid in selection is still in doubt. As compared to Herefords, F_1 Brahman x Hereford steers had significantly higher dressing percentages, longer legs, and larger eye muscles. Approximately half the difference in dressing percentage could be accounted for on the basis of paunch contents.

8. Studies at the Maryland station on estimating weights at a standard age from daily gains in periods preceding or bracketing the standard age indicated that 180-day weight could be estimated satisfactorily from: (a) birth and 146-day weights, (b) birth and 202-day weights and (c) 146- and 202-day weights. Using average rather than actual birth weights did not seriously affect the estimates.

9. Comparisons of the weanling and maternal performance of Brahman crossbred animals as compared with British types continued at the Georgia, Florida, North Carolina, Texas and South Carolina stations with results generally in line with previous years, although at the Texas and Georgia stations the feedlot gains of crossbreds were relatively lower than in many studies. At the South Carolina station both Brahman crosses and crosses between British breeds again outperformed purebred British calves at weaning. This trend has been so consistent for several years as to strongly suggest the need for more crossbreeding work with British cattle. An analysis of calf weaning weights from cows of various breeding accumulated at the Ona, Florida station over a period of several years ranked the cows in the following ascending order: native, British, over half Brahman, less than half Brahman, and half Brahman.

10. At the Louisiana station in the first year of the first comparison to date between cows of the new Brahman-Angus strain developed at Jeanerette, Louisiana during the past twenty years and cows of purebred Angus, Hereford and Brahman breeding, calves from the cows of the new strain averaged 22, 49, and 52 pounds heavier, respectively, at six months with calves from each breed of cow sired by the same bulls.

11. At the Louisiana station in the first known experiment station test of progeny performance of the Charolaise breed, 26 crossbred calves by a Charolaise bull had an average weight of 420 pounds at six months of age as compared to averages of 407, 373, 361, 356, and 351 pounds for progenies of bulls of five other breeds in the same experiment.

12. A limited number of calves born thus far at the North Carolina station from intermating Romo Sinuano x Hereford crossbreds have been heavier at weaning and poorer in body type scores than calves of other breeds raised at the same location. The original Romo Sinuano crosses were made by flying in semen from Colombia, South America for artificial insemination.

The figures in the last three items (10, 11 and 12), while preliminary and necessarily inconclusive, are suggestive of the necessity for expanded experimental work with breeds not now common in the United States.

13. Blood chemistry work continued at the Texas station in efforts to find blood constituents related to factors of economic value. Most high gaining animals were again found to have an intermediate blood protein bound iodine level, but low gaining animals with similar levels were also observed. Serum alkaline phosphatase levels of Brahman cattle were found to be approximately double that of British type cattle, while that of crossbred animals is intermediate.

14. Heat tolerance studies were initiated at the Texas station and preliminary analysis is partially complete. These data include 366 animal observations in the heat chamber for eight hours at 105°F and 50 percent relative humidity together with supplementary field observations. The data show by analysis of variance methods, a highly significant difference between breeds or cross (Hereford, Brahman, and Hereford x Brahman cross) and between sexes for body temperature, respiration rate, and pulse rate. For body temperature and chamber respiration rate Brahmans were lowest, crossbreds intermediate and Herefords highest. Repeatabilities of heat chamber observations on the same animals at successive exposures ranged from .32 to .62 for the various criteria. Preliminary calculations indicate relatively low but in some cases statistically significant relationships between heat chamber ratings and performance items.

4. APPLICATION OF RESULTS AND BENEFITS REALIZED:

The two most positive indications of present application of findings in this project to the beef cattle industry comes from (1) the continued and apparently expanding interest of purebred breeders in entering their bull calves for evaluation in cooperative feeding tests such as those sponsored at three locations in Texas by that station and at Auburn, Alabama by the Alabama station, and (2) a cooperative performance testing program organized in Virginia during 1953 at the request of breeders and as a direct outgrowth of research. Ten breeders are currently cooperating.

Breeders, extension personnel and writers for the popular agricultural press have continued to exhibit interest in work of the project. A distinct tendency for extension personnel to increasingly emphasize items of productive importance in addition to type has been noted since the inception of this project.

5. WORK PLANNED FOR NEXT YEAR:

For the most part the breeding herds in this project are in long time experiments and will be continued on essentially the same basis as during the past year. Increased emphasis will be placed on evaluation of results, analysis of data, and the pooling of data from several stations where desirable to study a question thoroughly.

The Florida station is initiating studies on physiology of reproduction in connection with other studies in that state.

At the Georgia station it is planned to add a group in which selection will be solely for type to compare with herds being selected for performance items.

No stations in the region as yet have formal projects for studying dwarfism. With the apparent increase in importance of this problem, such studies may be necessary.

6. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING YEAR:

Arkansas

Brown, C. J. The Relationship Between Score and Live Animal Measurements. Presented at annual S-10 Technical Committee Meeting, Knoxville, Tenn., 1953.

Brown, C. J., Warren Gifford and Maurice L. Ray. A Subjective Method for Evaluating Conformation of Beef Cattle. Permanency and Accuracy of Conformation Scores. Ark. Agric. Expt. Sta. Bull. 540, 1953.

Leuker, Carl E. Factors Affecting Beef Cow Performance, Thesis, Univ. of Ark. Library, 1953.

Weir, Leslie B. The Influence of Rainfall, Temperature and Humidity on the Feed Consumption, Gains and Efficiency of Beef Cattle. Thesis, Univ. of Ark. Library, 1953.

Florida

Peacock, Fentress M., W. G. Kirk and Marvin Koger. Effect of Breeding of Dam on Weaning Weight of Range Calves. Jour. An. Sci. 12(4): 896,897, 1953.

Pearson, A. M., Marvin Koger, W. G. Kirk, D. H. Kropf, R. B. Sleeth and J. F. Hentges, Jr. A Comparison of Certain Carcass Characteristics of Brahman Versus British Breeds of Steers. Jour. An. Sci. 12(4): 897, 1953.

Louisiana

Andrews, N. T. Feed-Lot Performance of Various Beef Grades and Crosses. A Master's Thesis.

Francioni, J. B. and R. A. Damon, Jr. A Preliminary Study of the Feed Lot Performance of Certain Beef Grades and Crosses, and A Proposed Experimental Plan for Studying Various Beef Breeds and Crosses. Proc. Assn. South. Agric. Workers, pp. 59, 1953 (abstract).

Maryland

Green, W. W., and John Buric. Comparative Performance of Beef Calves Weaned at 90 and 180 Days of Age. Jour. An. Sci. 12: 561-572, 1953.

North Carolina

Stewart, H. A. Beef Cattle Research in North Carolina. N. C. Exp. Sta. Quarterly (in press).

Tennessee

Guill, James T. The Repeatability of Cow Performance in Beef Cattle. M. S. Thesis, Univ. of Tenn. Library, 1953.

Paysinger, John R. The Repeatability of Cow Performance in Beef Cattle. M. S. Thesis, Univ. of Tenn. Library, 1953.

Smith, H. J., E. J. Warwick, J. R. Paysinger, J. T. Guill and C. S. Hobbs. Repeatability of Cow Performance. Prepared for presentation at Assn. South. Agric. Workers Meeting, Dallas, Texas, February 1954.

Texas

Butler, O. D. Carcass and Slaughter Data from Bluebonnet Farm Short Fed Yearlings. Presented at Staff Conference of Texas Agric. Expt. Sta., College Station, Oct. 22, 1953.

Cartwright, T. C. Heat Tolerance Studies at Bluebonnet Farm. Presented at Staff Conference of Texas Agric. Expt. Sta., College Station, Oct. 22, 1953.

Warwick, Bruce L. Comparative Carcass Characteristics of Brahman Crossbreds and British Type Cattle. Paper presented at annual S-10 Technical Committee Meeting, Knoxville, Tenn., Sept. 1, 1953.

Warwick, Bruce L. and T. C. Cartwright. Beef Cattle Experiments at Bluebonnet Farm. Paper presented at Second Inter-American Zebu Cattle Congress, San Antonio, Feb. 19, 1953.

Warwick, B. L., T. C. Cartwright, J. G. Moffitt, M. W. Hazen, G. L. Robertson and O. D. Butler. Detailed Carcass Studies in a Beef Breeding Program. A summary of two years work. Proc. Assn. South. Agric. Workers, pp.62, 1953 (abstract).

Texas (cont'd)

Kunkel, H. O., R. W. Colby and C. M. Lyman. The Relationship of Serum Protein-Bound Iodine Levels to Rates of Gain in Beef Cattle. Jour. An. Sci. 12: 3, 1953.

Burns, K. H., R. W. Colby, P. Gougler, and H. O. Kunkel. Correlation Between Serum Protein-Bound Iodine Levels and Metabolic Rates in Male Bovine. Am. Jour. Physiol., 172: 107, 1953. (Note: The two preceding papers above appeared in print during the year and are given here with exact references. They were listed in last year's report as "in press".)

Kunkel, H. O., D. K. Stokes, Jr., W. B. Anthony, and M. F. Futrell. Serum Alkaline Phosphatase Activity in European and Brahman Breeds of Cattle and Their Crossbred Types. Jour. An. Sci. 12: 766, 1

Stokes, D. K., Jr., M. F. Futrell, and H. O. Kunkel Further Studies on the Relationship of S Protein-Bound Iodine Levels to Rates of Beef Cattle. Jour. An. Sci. 12: 897, 1 (abstract).

Virginia

Grizzle, James E. The Relationship Between Body Daily Gain and Efficiency of Feed Utilizat Beef Cattle. M.S. Thesis, Virginia Polytec Institute, 1953.

Grizzle, J. E., and C. M. Kincaid. The Relation of Sie to Feed Consumption by Beef Cattle. Proc. Assn South. Agric. Workers. pp. 58, 59, 1953 (abstract,

Kincaid, C. M., R. C. Carter and J. S. Copenhaver. Heritability of Rate of Gain from Progeny Tests with Beef Cattle. Proc. Assn. South. Agric. Workers, pp. 60, 1953 (abstract).

APPROVED:

Chairman, Technical Committee

Regional Adm.